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DAVID PINGREE

FROM ASTRAL OMENS TO ASTROLOGY FROM BABYLON TO BĪKĀNER

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ABBREVIATIONS

ABCD: F. Rochberg-Halton, *Aspects of Babylonian Celestial Divination*, Horn 1988.

ABORI: *Annals of the Bhandarkar Oriental Research Institute*.

ACT: O. Neugebauer, *Astronomical Cuneiform Texts*, 3 vols., London 1955.

AfK: *Archiv für Keilschriftforschung*.

AfO: *Archiv für Orientforschung*.

BI: *Bibliotheca Indica*.

BO: *Bibliotheca Orientalis*.

BPO: E. Reiner & D. Pingree, *Babylonian Planetary Omens*, 2 fascs., Malibu 1975-1981.

BSOAS: *Bulletin of the School of Oriental and African Studies*.

CCAG: *Catalogus Codicum Astrologorum Graecorum*, 12 vols. in 20 parts, Bruxelles 1898-1953.

CESS: D. Pingree, *Census of the Exact Sciences in Sanskrit*, Series A, vols. 1-5, Philadelphia 1970-1994.

CII: *Corpus Inscriptionum Indicarum*.

CP: *Classical Philology*.

DOP: *Dumbarton Oaks Papers*.

DSB: *Dictionary of Scientific Biography*, 16 vols., New York, 1970-1980.

EIr: *Encyclopaedia Iranica.*

EW: *East and West.*

GAS: F. Sezgin, *Geschichte des arabischen Schrifttums.*

GMS: *Grazer Morgenländische Studien.*

GOS: *Gaekwad Oriental Series.*

HAMA: O. Neugebauer, *History of Ancient Mathematical Astronomy*, 3 vols., New York 1975.

HOS: *Harvard Oriental Series.*

JAOS: *Journal of the American Oriental Society.*

JCS: *Journal of Cuneiform Studies.*

JEOL: *Jaarbericht van het Vooraziatisch-Egyptisch Genootschap.*

JHA: *Journal for the History of Astronomy.*

JHAS: *Journal for the History of Arabic Science.*

JNES: *Journal of Near Eastern Studies.*

JWCI: *Journal of the Warburg and Courtauld Institutes.*

OLZ: *Orientalische Literaturzeitung.*

RA: *Revue d'Assyriologie.*

RSO: *Rivista degli studi orientali.*

SAA: *State Archives of Assyria.*

SHMS: *Studies in History of Medicine and Science.*

SJS: *Singhi Jain Series.*

SÖAW: *Sitzungsberichte der Österreichische Akademie der Wissenschaften.*

ZA: *Zeitschrift für Assyriologie.*

ZDMG: *Zeitschrift der Deutschen Morgenländischen Gesellschaft.*

ZGA-IW: *Zeitschrift für Geschichte der arabisch-islamischen Wissenschaften.*

ZPE: *Zeitschrift für Papyrologie und Epigraphik.*

INTRODUCTION

This collection of essays is intended to explore the development of celestial omens in Mesopotamia, their relationship to the astrology developed in the Hellenistic period by the Greeks, and the spread of astrology to the East and its amplification there. In these studies I have attempted to illustrate the incredible facility with which these sciences, which serve as an example for other systems of knowledge, were transmitted from one culture to another, and to indicate a few ways in which the recipient cultures changed the received theories. I have and will write more extensively elsewhere about the technical transformations that accompanied the transmissions.

For this book is not a technical history of the origins and internal development of astrology, but a simple narrative, based on all of the known original sources, of a number of cases of transmission. The first and last chapters deal with the transmission of knowledge within the cultures of Mesopotamia and India respectively; the second with the creation of astrology, in part from material transmitted from Mesopotamia, in the Greek East; the third with the transmission of astrology to India from Greece; the fourth with the evidence for the transmission of astrology to Sasanian Iran from Greece and India; the fifth with an Indian astrologer serving some of the early ʿAbbāsid caliphs; the sixth with the transmission of Arabic astrology to Byzantium; and the seventh with the transmission of Arabic/Persian astrology to India. The evidence that each of these transmissions was an historical reality rests on three foundations: the direct statements by the recipients concerning the source of their knowledge, the use of transliterated technical terms, and the improbability that complex theories which, as I hope all my readers will agree, are invalid as explanations of the world would

be constructed independently in different cultures. The same general considerations provide the evidence for similar transmissions of astronomy.

I have deliberately avoided any departure from the writings inscribed on clay tablets in Sumerian and Akkadian or written on parchment, paper, and other materials in Greek, Latin, Sanskrit, Pahlavī, and Arabic; except for cautious interpretations of the historical significance of the internal and external features of these texts and the manuscripts that preserve them there is nothing in this book beyond the facts that must be the basis for understanding the processes I have chosen to investigate. I hope that the result is a firm foundation for future scholarship in the history of celestial divination and of astrology in the East.

* * *

These eight essays are based on a series of lectures that I gave in Rome, Bologna, and Venice in June 1995. I am most grateful to my generous hosts at the Universities of those three cities and at IsMEO who made every effort to make my visit to their institutions enjoyable and rewarding. I am particularly indebted to Antonio Panaino, who organized with incredible efficiency my entire program, and to Gherardo Gnoli, who has graciously accepted this book for publication in the 'Serie Orientale Roma'. Finally I thank my wife, Isabelle, who typed the manuscript with her usual uncommon accuracy. To her I dedicate this book.

Providence, R.I.
29 November 1995

CHAPTER 1
MESOPOTAMIAN CELESTIAL OMENS

The reading of celestial omens was a relatively late development within the Mesopotamian sciences of omens[1], following after extispicy, oneiromancy, teratology, and physiognomy, and more or less contemporaneous with animal and plant omens. Normally the gods communicated with the king through extispicy, in which, in response to a question, Šamaš, the Sun god, conveyed the gods' reply by contorting the liver and other internal organs of a sheep[2]. By celestial omens the gods, without being asked any question, voluntarily communicated to the king their intentions by altering the normal appearance and behaviour of the stars and planets, which serve as the physical manifestations of the divine powers in the world of men. The description of the ominous phenomena forms the protasis of an omen, the associated phenomena affecting the king, his court, and his country constitute the apodosis. The usefulness of these divine warnings lay in the fact that propitiation rituals, called *namburbis*, could assuage the anger of the gods and ameliorate the situation of the king.

From the last half of the 2nd millennium B.C., the principle collection of celestial omens in Akkadian was the series of probably more than seventy

[1] On the types of omens typically used in the early 2nd millennium see, e.g., J.M. Durand, *Archives epistolaires de Mari III*, Paris 1988.

[2] On Mesopotamian extispicy see also I. Starr, *The Rituals of the Diviner*, Malibu 1983, and U. Jeyes, *Old Babylonian Extispicy*, Istanbul 1989.

Tablets entitled *Enūma Anu Enlil*[3], though there exists abundant evidence of non-canonical omens either cited as such in the *Letters*[4] and *Reports*[5] of the celestial diviners, alluded to in texts such as the *Diviner's Manual*[6], or preserved on tablets specifically designated as extra-canonical (*aḫū*)[7]. The earlier history of celestial omens in Mesopotamia is hard to delineate. There probably were such omens being observed in late Sumerian times, in the late 3rd millennium B.C., though no Sumerian tablets with such contents are as yet available. However, the technical terms in the protases of the Akkadian omens are normally written with Sumerian logograms; and some of the lunar eclipse omens refer in their apodoses to historical events from the late Dynastic Period, in particular concerning the dynasty of Akkad and the Ur III dynasty which the descriptions of lunar eclipses allow us to date at least tentatively in the time between 2300 and 2050 B.C.[8]. There is no hard evidence, however, that a system of interpreting such omens existed at this early period.

From the Old Babylonian Period itself — that is, roughly, the first half of the 2nd millennium — we have a small number of surviving tablets. The oldest fragment deals with the appearance of the sky and the Moon on certain numbered days in a lunar month[9]. An Akkadian text found at Emar, in

[3] Ch. Virolleaud, *L'Astrologie Chaldéenne*, 3 vols., in 14 fascs., Paris 1905-1912. This is being replaced by a new edition, of which there have appeared: F. Rochberg-Halton, *Aspects of Babylonian Celestial Divination: The Lunar Eclipse Tablets of Enūma Anu Enlil*, *AfO Beiheft*, 22, Horn 1988 (Tablets 15-22); W.H. van Soldt, *Solar Omens of Enūma Anu Enlil: Tablets 23 (24)-29 (30)*, Istanbul 1995; and E. Reiner & D. Pingree, *Babylonian Planetary Omens*, fasc. 1, Malibu 1975 (Tablet 63), fasc. 2, Malibu 1981 (Tablets 50-51; see also W. Horowitz, 'A Join to Enuma Anu Enlil 50', *JCS*, 46, 1994, pp. 127-29), and fasc. 3, (Tablets 59 (?)-62(?)). See also F.N.H. Al-Rawi & A.R. George, 'Enūma Anu Enlil XIV and Other Early Astronomical Tables', *AfO*, 38/39, 1991-1992, pp. 52-73, and, for a preliminary list of copies of Tablets 1 to 50, E.F. Weidner, 'Die astrologische Serie Enūma Anu Enlil', *AfO*, 14, 1941-1944, pp. 172-95 and 308-18; 17, 1954-1956, pp. 71-89; and 22, 1968-1969, pp. 65-75; and U. Koch-Westenholz, *Mesopotamian Astrology*, Copenhagen 1995.

[4] S. Parpola, *Letters from Assyrian Scholars to the Kings Esarhaddon and Assurbanipal*, 2 vols., Neukirchen-Vluyn 1970-1983; the first volume, containing texts and translations, has been replaced by Id., *Letters from Assyrian and Babylonian Scholars*, *SAA*, 8, Helsinki 1993; see, for instance, Letter 101.

[5] H. Hunger, *Astrological Reports to Assyrian Kings*, *SAA*, 10, Helsinki 1992; see, for instance, Report 147.

[6] A. Leo Oppenheim, 'A Babylonian Diviner's Manual', *JNES*, 33, 1974, pp. 197-220.

[7] F. Rochberg-Halton, 'The Assumed 29th *Aḫū* Tablet of Enūma Anu Enlil', in *Language, Literature, and History*, ed. F. Rochberg-Halton, New Haven 1987, pp. 327-50; Id., 'Canonicity in Cuneiform Texts', *JCS*, 36, 1984, 127-44.

[8] P.J. Huber, 'Dating by Lunar Eclipse Omina', *From Ancient Omens to Statistical Mechanics*, Copenhagen 1987, pp. 3-13, and the literature citated therein.

[9] Th. Bauer, 'Eine Sammlung von Himmelsvorzeichen', *ZA*, 43, 1936, pp. 308-14, reporting on a text originally published by V. Šileico in Russian in 1927.

Syria, of which a Hittite version has also been found, is concerned with the appearance of the horns of the crescent Moon[10]. There are four Old Babylonian tablets concerning lunar eclipses[11]. And lunar eclipse omen texts in Akkadian have also been found at Emar[12] and at Mari[13], also in Syria. Beyond this we are left with conjectures, such as that a group of the Venus omens is substantially constituted of Old Babylonian omens, or with such facts as that the observations of the heliacal risings and settings of Venus in Tablet 63 were made during the reign of Ammiṣaduqa[14], who most likely reigned from 1702 to 1681 B.C.[15], though we are not at all certain that they were originally regarded as ominous.

From the third quarter of the 2nd millennium we have a greater variety of omens, but not a significantly greater number of texts, and those that we do have come mostly from marginal localities. From the lunar omens not involving eclipses there survives only an Elamite translation found at Susa[16]. There exist more tablets relating to lunar eclipses[17]. In Akkadian is written a Middle Assyrian tablet found at the Nabū Temple in Nineveh, though perhaps it had been brought there from Assur during the reign of Tiglathpileser I[18]; this tablet is related to parts of the surviving Old Babylonian tablets that I have mentioned and of Tablet 15 of *Enūma Anu Enlil*, the first in that series to deal with lunar eclipses. Also from Assur are three fragments, one of Tablet 15 and two of Tablet 20[19]. A Middle Babylonian text from Nippur remains unpublished[20]. A tablet containing a version of Tablet 22 was found at Susa[21], and another at Qatna in Syria[22]. A group of lunar (including lunar

[10] H.G. Güterbock, 'Bilingual Omens from Boğasköy', *A Scientific Humanist: Studies in Memory of Abraham Sachs*, Philadelphia 1988, pp. 161-73; Güterbock refers to several other Hittite texts on lunar omens. See also E.F. Weidner, 'Astrologische Texte aus Boghazköi', *AfK*, 1, 1923, pp. 1-8, and U.K. Westenholz, 'Mesopotamian Astrology at Hattusas', in *Die Rolle der Astronomie in den Kulturen Mesopotamiens*, ed. H.D. Galter, *GMS*, 3, Graz 1993, pp. 231-46.

[11] To be published by F. Rochberg; see *ABCD*, pp. 19-22, and cf. the Old Babylonian orthography preserved in Tablet 22.

[12] *ABCD*, p. 32.

[13] Durand, *op. cit.*, pp. 504-6.

[14] Besides *BPO*, 1, see C.B.F. Walker, 'Notes on the Venus Tablet of Ammiṣaduqa', *JCS*, 36, 1984, pp. 64-66.

[15] P.J. Huber et al., *Astronomical Dating of Babylon I and Ur III*, Malibu 1982.

[16] V. Scheil, 'Déchiffrement d'un document anzanite relatif aux présages', *RA*, 14, 1917, pp. 29-59.

[17] *ABCD*, pp. 273-79; cf. also pp. 23-25.

[18] *ABCD*, pp. 70-74 (Source B).

[19] *ABCD*, pp. 217-19 (Sources Y and Z).

[20] *ABCD*, p. 25.

[21] V. Scheil, 'Un fragment susien du livre *Enuma Anu (ilu) Ellil*', *RA*, 14, 1917, pp. 139-42; see also *ABCD*, p. 271.

[22] J. Bottéro, 'Autres textes de Qatna', *RA*, 44, 1950, pp. 105-122, esp. pp. 105-12 and 117; see also *ABCD*, pp. 271-72.

eclipse) and solar omen tablets, with some references to planets and constellations, was discovered at Emar in Syria[23]. Also from Syria, from Alalakh, are two pieces, one connected with the Old Babylonian and Hittite traditions, the other with either Tablets 17-18 or 22[24]. The Hittite tradition is represented by two pieces in Akkadian, of which one contains Section II of Tablet 19[25], and several Hittite adaptations of Akkadian material[26]. Also from Boghazköi comes a collection of solar omens, including solar eclipses, written in Akkadian[27]. It is claimed also that a text written in Ugaritic from the Late Bronze Age III (*c.* 1350 to 1175 B.C.) mentions a solar eclipse, which has been variously dated to 3 May 1375 B.C.[28] and to 5 March 1222 B.C.[29]; a necessary word of caution about any such interpretation of this opaque text has been issued by Walker[30]. In any case, the solar eclipse itself, if such it was, was not interpreted as an omen, but the phenomenon apparently provoked an interrogation of the gods through an extispicy. However, a few fragments of celestial omens, mostly lunar, have been found at Ugarit[31]. Finally, from this period we have two fragments of tablets in Akkadian containing 'meteorological' omens; one, concerning earthquakes, was found at Nuzi[32], and the other, on thunder-storms, at Nippur[33].

Now we must turn to the question of the construction of a canonical series out of this and other material. The series bears the title of the first three words in its introduction — or at least the introduction to the first section, that on the Moon, called Sin by modern scholars — *Enūma Anu Enlil*. This

[23] D. Arnaud, *Recherches au pays d'Aštata — Textes sumériens et accadiens. Emar*, VI 4, Paris 1987, pp. 251-82 (nos. 650-65).

[24] P.J. Wiseman, *The Alalakh Tablets*, London 1953, pp. 114-15 and plates LII-LIII; see also *ABCD*, pp. 32-33.

[25] *ABCD*, p. 168.

[26] *ABCD*, pp. 33-34.

[27] M. Leibovici, 'Un texte astrologique akkadien de Boghazköi', *RA*, 50, 1956, pp. 11-21.

[28] F.R. Stephenson & J.F. Sawyer, 'Literary and Astronomical Evidence for a Total Eclipse of the Sun Observed in Ancient Ugarit on 3 May 1375 B.C.', *BSOAS*, 33, 1970, pp. 467-89; see also F.R. Stephenson, 'The Earliest Known Record of a Solar Eclipse', *Nature*, 228, 1970, pp. 651-52.

[29] T. de Jong & W.H. van Soldt, 'Redating an Early Solar Eclipse Record (KTU I. 78)', *JEOL*, 30, 1987-1988, pp. 65-77; see also W.H. van Soldt & T. de Jong, 'The Earliest Known Solar Eclipse Record Redated', *Nature*, 338, 1989, pp. 238-40, and W.C. Seitter & H.W. Duerbeck in M. Dietrich & O. Loretz, *Mantik in Ugarit*, Münster 1990, pp. 281-86.

[30] C.B.F. Walker, 'Eclipse Seen at Ancient Ugarit', *Nature*, 338, 1989, pp. 204-5.

[31] Dietrich & Loretz, *op. cit.*, pp. 165-95.

[32] E.R. Lacheman, 'An Omen Text from Nuzi', *RA*, 34, 1937, pp. 1-8.

[33] A. Ungnad, 'Ein meteorologischer Bericht aus der Kassitenzeit', *OLZ*, 15, 1912, pp. 446-49.

introduction appears in Sumerian and Akkadian; there is also a Hittite translation that must date from before 1300 B.C.[34]. Perhaps even earlier is a copy from Emar[35], though it appears at the end of a tablet on lunar eclipses rather than as the introduction to a series. The occurrence of the introduction, then, does not necessarily indicate that a series had been formed, nor does it inform us of its contents if it had indeed been formed.

A letter written by the priest of Assur, Ākkullānu, to Assurbanipal in 657 B.C. quotes from a meteorogical omen included in a *Report* sent by Eamušallim to Marduk-nadim-aḫḫe, the king of Babylonia from 1099 to 1082 B.C.[36]. This shows that in *c.* 1100 B.C. the Babylonian king employed observers who reported to him on celestial phenomena, and that an archive of their reports was available in Nineveh in the 7th century B.C. Unfortunately, in Weidner's attempt to identify tablets from the library of Marduk-nadim-aḫḫe's Assyrian contemporary, Tiglathpileser I (1114 to 1076 B.C.), found at Assur[37], only one tablet is, though doubtfully, identified as containing celestial omens[38]. But there are many tablets found at Assur containing celestial omens, including the Middle Assyrian copies of Tablets 15 and 20 that we have already referred to. Also from Assur comes a fragment of a catalogue of *Enūma Anu Enlil*[39]; this broken fragment lists only Tablets numbered 39 to 60, of which Tablets 39 and 40 belong to the section on meteorogical omens (Adad), while Tablets 46 and following seen to belong to the section on constellation and planetary omens (Ištar). The numbers of the Tablets given in this catalogue do not correspond to the numbers that can be assigned to Tablets with the same incipits found at Nineveh. We do not know as yet what more substantive differences may have existed between the celestial omens at Assur, those at Nineveh, and those at Babylon.

The great mass of tablets containing celestial omens, whether canonical or not, comes from Assurbanipal's library at Nineveh. One of the most important persons instrumental in building up this collection was the priest Nabū-zuqup-kēnu of Kalaḫ (Nimrud), who copied the series under Sargon II (721 to 705 B.C.) and Sennacherib (704 to 681 B.C.), often from tablets that had originated in Babylon or Borsippa[40]. It was probably this same scribe who copied *Enūma Anu Enlil* at Kalaḫ onto sixteen waxed ivory tablets for Sargon II's palace at Khorsabad between 712 and 705 B.C.[41]. We are also

[34] KUB XXXIV 12; see Westenholz, *op. cit.*, p. 236.
[35] Arnaud, *op. cit.*, p. 263 (*Emar* VI 652, 80′-83′).
[36] S. Parpola, *SAA*, 8, pp. 76-78 (no. 100).
[37] E. Weidner, 'Die Bibliothek Tiglatpilesers I', *AfO*, 16, 1952-1953, pp. 197-215.
[38] *Ibid.*, p. 200 (VAT 9478).
[39] E. Weidner in *AfO*, 14, 1941-1944, pp. 184-86 and Tafel III (VAT 9438 + 10324).
[40] *Ibid.*, pp. 176-77.
[41] D.J. Wiseman, 'Assyrian Writing Boards', *Iraq*, 17, 1955, pp. 3-13.; see also H. Hunger, 'Neues von Nabû-zuqup-kēna', *ZA*, 62, 1972, pp. 99-101.

fortunate to have fragments of three accession lists to Assurbanipal's library[42]. From these records we learn of 107 tablets and 6 boards containing parts of *Enūma Anu Enlil* being accessioned at the library at Nineveh as a result primarily of the confiscation of private libraries in Babylonia that took place in 647 B.C., the year following Assurbanipal's conquest of Babylon. This emphasizes the fact that the copies of celestial omens found at Nineveh do not represent a uniform tradition, but were collected from many parts of Mesopotamia.

The same can be seen from the *Reports* and *Letters* sent to Esarhaddon (680 to 669 B.C.) and Assurbanipal (668 to 627 B.C.) from 'colleges' of ten celestial observors each located at such cities as Arbella, Assur, Babylon, Borsippa, Cutha, Dilbat, and Uruk, as well as, of course, from Nineveh itself[43]. Since these observors constantly quote from non-canonical collections of celestial omens, copies of these texts were spread all over Mesopotamia — and the authorities in Nineveh undoubtedly had their own copies in which they could check the accuracy of the citations. One of these observors, Šumaya (perhaps he who is referred to as the son of Nabū-zeru-lešir in two *Letters*[44] though another Šumaya was the son of [Kabt]iya[45]), wrote eight *Reports* to Assurbanipal[46], in the last of which he refers to his discussion with the king at Ur concerning the writing-boards and tablets of *Enūma Anu Enlil* and refers to himself as the 'scribe of *Enūma Anu Enlil*'. This appears to be the first occurrence of the title which was later to be utilized by the scribes of the *Diaries* and of the astronomical tables in Babylon and Uruk[47].

[42] S. Parpola, 'Assyrian Library Records', *JNES*, 42, 1983, pp. 1-27.

[43] A.L. Oppenheim, 'Divination and Celestial Observation in the Last Assyrian Empire', *Centaurus*, 14, 1969, pp. 97-135.

[44] *SAA*, 8, pp. 203 (no. 257) and 228 (no 291).

[45] *SAA*, 8, p. 308 (no 371). One of these Šumayas may have been the ritualist who was criticized by Nabū-nadin-šumi for hastening from Kalaḫ to usurp the functions of the writer; *SAA*, 8, p. 214 (no. 273).

[46] *SAA*, 10, pp. 102-4 (nos. 175-180) and 274 (nos. 498-499).

[47] In the *Diaries* themselves, in so far as they have yet been published (A. Sachs & H. Hunger, *Astronomical Diaries and Related Texts from Babylon*, vols. 1-2, Wien 1988-1989), the few instances in which the scribe's name is recorded (373 B.C. in vol. 1, p. 115; 362 B.C. in vol. 1, p. 139; 325 B.C. (?) in vol. 1, p. 203; 322 B.C. in vol. 1, p. 229; and 282 B.C. (?) in vol. 1, p. 309) the title is not used. But a number of documents dated between 127 and 116 B.C. refer to several 'scribes of *Enūma Anu Enlil*' who were employed by the Esagila or Temple of Marduk in Babylon to make observations, presumably for the *Diaries* (R.J. van der Spek, 'The Babylonian Temple during the Macedonian and Parthian Domination', *BO*, 42, 1985, pp. 542-62, esp. pp. 548-54, which improves the translations and interpretations offered by G.J.P. McEwan, *Priest and Temple in Hellenistic Babylonia*, Wiesbaden 1981, pp. 17-21). One of the families to which some of these astronomers belonged was descended from a certain Mušēzib; this family was also involved in copying *Diaries* (that for 322 B.C. and, probably, those for 362 and 325 B.C.) and astronomical tables at Babylon (*ACT*, vol. 1, pp. 15-16, and J.P. Britton & C.B.F. Walker, 'A 4th Century Babylonian Model for Venus:

As we turn, then, to consider the celestial phenomena that are found in the canonical Tablets of *Enūma Anu Enlil* and some of the non-canonical tablets as well, the overwhelming majority of which are known to us through tablets from Assurbanipal's library, we must keep in mind the fact that many of these protases go back to earlier times, and that the 7th-century collection at Nineveh represents traditions from all over Mesopotamia and beyond (e.g., from Elam). We are not yet well enough informed to distribute these omens chronologically and spatially in a definitive manner; so, having entered this caveat, I will describe the phenomena briefly as they are.

The section on the Moon, called in modern times Sin, deals with the appearance of the Moon and of the sky at the times of the luminary's appearance at the end of the month, at its appearance as New Moon (with special attention paid to its horns), at Full Moon, and at its rising in general; with halos large and small surrounding the Moon, and sometimes enclosing a constellation or a planet as well; and with lunar eclipses. The variables connected with the interpretation of lunar eclipses include[48]: the month and day of the month in which it occurs; whether it occurs at the 'expected time' or not; the watch of the night in which it occurs; the duration of the eclipse; its magnitude; the direction in which the obscuration moves; the color of the eclipsed Moon; the direction in which the wind is blowing; the concurrent occurrence of clouds, rain, thunder and lightning, or earthquakes and mudslides; and the visibility of nearby planets and constellations during the eclipse. Between the first set of Tablets and those devoted to lunar eclipses is Tablet 14 on which are recorded tables for determining the duration of visibility of the Moon on each of the 30 nights of an equinoctial month according to the traditions of Nippur and of Babylon; the lengths of the day and of the night on the fifteenth and thirtieth *nychthemeron* of each month; and the periods of visibility of the Moon on the first day and the periods till rising on the fifteenth day of every month. This is the only tablet in *Enūma Anu Enlil* that deals exclusively with mathematical astronomy.

In the section on solar omens (Šamaš) the ominous phenomena include the appearance of the Sun at the sunrise following the sighting of the crescent Moon in each month of the year; halos surrounding the Sun; *parhelia* (and *paraselenes*); the positions and colors of cloud formations at sunrise, and the orange glow above the horizon shortly before sunset; the visibility of planets and constellations with the Sun; and solar eclipses.

B.M. 33552', *Centaurus*, 34, 1991, pp. 97-118, esp. pp. 110-12). In none of their colophons is any of the numerous members of this family entitled 'scribe of *Enūma Anu Enlil*', but two other scribes of astronomical texts from Babylon (one dated 103 B.C.) as several from Uruk are called by this title (*ACT*, vol. 1, pp. 13-15). The revival of the title, then, cannot at present be confirmed for pre-Seleucid periods, though it might go back to Mušēzib, who certainly lived some time before 322 B.C.

[48] *ABCD*, pp. 36-63.

The next section (Adad), which refers to 'meteorological' phenomena in the protases, is based on the time, frequency or duration, direction, and magnitude of thunder, lightning, rain, rainbows, and earthquakes.

And the final section (Ištar) utilizes phenomena involving constellations and planets. For the constellations the omens are concerned with the times of their heliacal rising or settings in terms of the calendar, which is clearly assumed to be intercalated so that the months vary at most by one, and phenomena of faintness, brightness, scintillation, color, apparent motion, and mirages caused by the distortion of a star's light as it passes through the earth's atmosphere. For the planets[49] the phenomena can be divided into those that occur near the horizon and those that occur anywhere in the sky. The former include the planets' heliacal risings and settings, where the variants are: the time (including the question of whether or not it is the expected time), the position of the rising or setting point on the horizon (that is, which of the three 'paths' it is in), the duration of the period of visibility or invisibility, and the stars or other planets it is near at first or last visibility. Also, the horizon phenomena include whether the planet appears or disappears above the same point on the horizon on successive nights, and the optical illusions occasioned by the passing of the planet's light through the earth's atmosphere. Phenomena that occur anywhere in the sky are conjunctions with constellations or other planets, distortions due to clouds or haze, and, especially for Jupiter and Mars, retrogressions from one constellation to another. The Ištar section also includes omens involving meteors and comets, as well as ones in which constellations 'approach' each other; the Neo-Assyrian commentators interpreted the moving constellations in these last omens to be planets, but it seems possible that instead they were used as a celestial clock in much the same way as the decans were in ancient Egypt.

The importance of these celestial omens in Mesopotamian royal courts from the last few centuries of the 2nd millennium B.C. till the Achaemenid period depended on their being regarded as the principle means for the gods to signal their intentions to the king. Therefore, throughout this long period the kings (and probably their enemies) employed numerous observors to watch the heavens for the divine messages. In performing this duty, stargazers in Mesopotamia acquired an intimate knowledge of the varying appearances of the celestial bodies and of the motions of the Sun, the Moon, and the other planets. This familiarity led them to recognize the periodicity of certain celestial phenomena, and to devise increasingly sophisticated mathematical models permitting them to predict recurrences of those phenomena, at least approximately. This inaugurated the process that eventually led

[49] For Venus see D. Pingree, 'Venus Phenomena in *Enūma Anu Enlil*', *GMS*, 3, Graz 1993, p. 259-73.

to the development of mathematical astronomy.

Although we know virtually nothing about Mesopotamian celestial omens in the Achaemenid period beyond an Egyptian adaptation of solar and lunar eclipse omens and, probably, lunar omens[50], and Sanskrit versifications of Indian adaptations of omens from all sections of *Enūma Anu Enlil* (and *Šumma ālu*)[51], the tradition certainly continued into the Seleucid and Parthian periods when, as we have seen, astronomers at the both Babylon and Uruk often bore the title 'scribe of *Enūma Anu Enlil*' and when many copies of Tablets from that series, especially commented ones, were made[52] and a catalogue was compiled in Uruk[53]. It was probably during this late period that celestial omens of types belonging to *Enūma Anu Enlil* were translated into Greek[54]; the earliest fragments, associated with the name Petosiris or simply ascribed to the 'ancient Egyptians', seem to have been composed in the middle of the 2nd century B.C.[55]. Through the Sanskrit and Greek adaptations of these omens they spread in space to China and to Western Europe and in time, through Latin, Byzantine Greek, Hebrew, Syriac, Arabic, Persian, Sanskrit, Chinese, and other languages, through the medieval period to modern times.

But the diviners of the Late Babylonian period also began to devise new ways to apply celestial omens, ways that would appeal to all members of society rather than just to the kings in whose interest *Enūma Anu Enlil* was compiled but who, no longer being the products of Mesopotamian culture, but Macedonian or Parthian invaders, were not as enthusiastic to employ the diviners as had been the Neo-Assyrian and Neo-Babylonian kings, or even their Achaemenid successors. Bits of such attempts at modernization have been published; I mention as examples a text on making an economic fore-

[50] R.A. Parker, *A Vienna Demotic Papyrus on Eclipse-and Lunar-Omina*, Providence 1959.

[51] D. Pingree, 'Venus Omens in India and Babylon', *Language, Literature, and History*, New Haven 1987, pp. 293-315; Id., 'Babylonian Planetary Theory in Sanskrit Omen Texts', *From Ancient Omens to Statistical Mechanics*, Copenhagen 1987, pp. 91-99; Id., 'Mesopotamian Omens in Sanskrit', *La circulation des biens, des personnes et des idées dans le Proche-Orient ancien*, Paris 1992, pp. 375-79.

[52] See, e.g., S. Langdon, 'Miscellanea Assyriaca IV. An Omen Tablet', *Babyloniaca*, 7, 1913-1923, pp. 230-36; and the tablets from Uruk published by F. Thureau-Dangin, *Tablettes d'Uruk*, Paris 1922, plates XXX-XXXVI (nos. 16-18); by H. Hunger, *Spätbabylonische Texte aus Uruk*, Berlin 1976, pp. 93-95 (nos. 90-92); and by E. von Weiher, *Uruk. Spätbabylonische Texte aus dem Planquadrat U 18*, Mainz 1993, pp. 100-105 (nos. 160-62).

[53] E.F. Weidner, *AfO*, 14, 1941-1944, pp. 186-87.

[54] Some striking parallels were assembled by C. Bezold & F. Boll, *Reflexe astrologischer Keilinschriften bei griechischen Schriftstellern*, *SHAW*, Phil.-hist. Kl., Heidelberg 1911, Abh. 7; many more could be adduced.

[55] D. Pingree in *DSB*, vol. 10, New York 1974, pp. 547-49.

cast for the year on the basis of the positions of the planets at its beginning[56], several on predictions of and from the weather[57], and others associating various terrestrial objects with the zodiacal signs and indicating various undertakings appropriate to the astral conditions[58]. The other innovation was the application in the late 5th century B.C. of celestial omens to personal nativities to produce a class of texts (wrongly entitled 'horoscopes' since the latter term refers to the ascendant and implies the computation of the cusps of the twelve astrological places which play no role in these cuneiform texts). They remain omens applied to individuals, but partake of some of the characteristics of astrology.

[56] Hunger, *op. cit.*, pp. 95-99 (no. 93); this tablet was copied by a well-known scribe of Uruk, Iqīšā, in about 320 B.C.

[57] Thureau-Dangin, *op. cit.*, plats. XXXVII-XL (nos. 19-20); see H. Hunger, 'Astrologische Wettervorhersagen', *ZA*, 66, 1976, pp. 234-60.

[58] E.F. Weidner, *Gestirn-Darstellungen auf babylonischen Tontafeln*, *SÖAW*, phil.-hist. Kl. 254, Wien 1967, Abh. 2.

CHAPTER 2
THE ORIGINS OF GREEK ASTROLOGY

The science of astrology[1] was developed in, most probably, the late 2nd or early 1st century B.C.[2] as a mean to predict, from horoscopic themata draw up for the moment of an individual's birth (or conception), the fate of that native. This form of astrology, called genethlialogy, is rooted in Aristotelian physics and Hellenistic astronomy, but also borrowed much from Mesopotamia and some elements from Egypt as well as developing many theories of its own[3]. The adaptation of this form of astrology to determine the best time for initiating actions is termed catarchic astrology. These are the two main forms of astrology known in the West; interrogational astrology was developed in India in the 2nd and 3rd centuries A.D. on the basis of Greek catarchic astrology[4], and historical astrology in Sasanian Iran in perhaps the 5th or 6th century A.D. on the basis of continuous forms of Greek genethlialogy[5]. All of these types of astrology depend on the notion that the

[1] See D. Pingree, 'Astrology', in *Dictionary of the History of Ideas*, vol. 1, New York 1968, pp. 118-26.

[2] A.A. Long, 'Astrology: Arguments Pro and Contra', in *Science and Speculation*, Paris 1982, pp. 165-92.

[3] The two most significant treatments of Greek astrology are A. Bouché-Leclercq, *L'astrologie grecque*, Paris 1899, repr. Bruxelles 1963, now very much out of date, and W. & H.G. Gundel, *Astrologumena*, Wiesbaden 1966, which suffers severely from innumerable inaccuracies in dating and attribution and from a lack of awareness of the relevant material in Sanskrit and Arabic. Of fundamental importance for the manuscripts of Greek astrology is the *Catalogus Codicum Astrologorum Graecorum*, 12 vols. in 20 fascs., Bruxelles 1898-1953.

[4] See Chapter 3 below.

[5] See Chapter 4 below.

planets, in their eternal rotations about the earth, transmit motion (change) to the four elements and to the assemblages of elements, animate and inanimate, in the sublunar world. This theory is completely different from that of celestial omens, in which the gods, whose physical manifestations are the constellations and planets, send messages concerning their intentions regarding kings and countries by means of celestial phenomena. That these divine intentions con be altered by the use of propitiatory rituals (*namburbis* in Mesopotamia[6], *śāntis* in India[7]) emphasizes the fundamental conceptual difference between omens and astrology.

But astrology does have a Mesopotamian background. The oldest form of this pre-astrology is a 13th century B.C. Hittite tablet based on a translation from an Old Babylonian Akkadian text in which a brief prediction is made for a person depending on the month in which he was born[8]; this fragment is a part of the well-known series entitled *Iqqur īpuš*[9]. But the closest Babylonian parallels to Greek astrology are the so-called "horoscopes", which record planetary positions and other data at the time of a native's birth and, sometimes, computed conception[10], and the texts which inform the diviner about the interpretation of these omens[11]. These proto-horoscopes themselves

[6] E. Ebeling, 'Beiträge zur Kenntnis des Beschwörungsserie Namburbi', *RA*, 48, 1954, pp. 1-15; 76-85; 130-41; and 178-91; 49, 1955, pp. 32-41; 137-48; and 178-92; and 50, 1956, pp. 22-33; and 86-94; R. Caplice, 'Namburbi Texts in the British Museum', *Orientalia*, NS, 34, 1965, pp. 105-31; 36, 1967, pp. 1-38 and 273-98; 39, 1970, pp. 111-51; and 40, 1971, pp. 133-83; Id., 'An Apotropaion against Fungus', *JNES*, 33, 1974, pp. 345-49; Id., *The Akkadian Namburbi Texts: an Introduction*, Los Angeles 1974; and S. Parpola, *Letters from Assyrian Scholars to the Kings Esarhaddon and Assurbanipal. Part II*, Neukirchen-Vluyn 1983, pp. xxii-xxxiv.

[7] The earliest *śānti*-rituals in India date from the middle of the last millennium B.C.; see D. Pingree, *Jyotiḥśāstra*, Wiesbaden 1981, p. 67.

[8] B. Meissner, 'Ueber Genethlialogie bei den Babyloniern', *Klio*, 19, 1925, pp. 432-34, esp. p. 434.

[9] K.K. Riemschneider, *Babylonische Geburtsomina in hethitischer Übersetzung*, Wiesbaden 1970, p. 44, n. 39; the *Iqqur īpuš* text is R. Labat, *Un calendrier babylonien des travaux des signes et des mois*, Paris 1965, pp. 132-35 (§ 64).

[10] A. Sachs, 'Babylonian Horoscopes', *JCS*, 6, 1952, pp. 49-75, on pp. 54-63 published six 'horoscopes' datable 29 April 410 B.C. (mentions computed date of conception; brief prediction); 4 (?) April 263 B.C. (with predictions); 15 December 258 B.C. (computed date of conception; no prediction); 3 June 235 B.C. (with predictions); 3 July 230 B.C. (no predictions, but only four lines preserved); and 1 March 142 B.C. (no predictions preserved); and F. Rochberg-Halton, 'Babylonian Horoscopes and their Sources', *Orientalia*, NS, 58, 1989, pp. 102-23, on pp. 111-19 publishes three more datable 13 January 410 B.C. (no predictions); 4 February 202 B.C. (no predictions); and 3 September 76 B.C. (no predictions). At the time of writing this article Rochberg includes thirty-two relevant texts datable between 410 and 69 B.C. in her forthcoming edition.

[11] TCL VI 14 was transcribed and translated in Sachs, *op. cit.*, pp. 66-75; for TCL VI 13 see F. Rochberg-Halton, 'TCL 6 13: Mixed Traditions in Late Babylonian Astrology', *ZA*, 77, 1987, pp. 207-28. There exist a number of other such texts; see, for example, the excerpts

generally give little information beyond the date of birth, sometimes the date of conception, data concerning the Moon at the syzygies of the current month (presumably to be utilized in computing the date of conception), and the zodiacal signs (sometimes with degrees) in which the planets were positioned; occasionally it is also noted whether a planet was visible or not. The treatises on interpretation are difficult to interpret because of their use of a technical vocabulary that is not yet understood: the *tallu* in which a planet may stand, and the *DUR* and *miḫru* to which it may stand. Other, more obvious phenomena are a birth (when the Moon? or the Sun?) is in a place (*dodecatemorion*?) of each zodiacal sign, when each planet has come forth (risen), when one planet has come forth while another has set, when each planet has risen or set heliacally, when various fixed stars have come forth, and when one of the luminaries is eclipsed.

One of the predictions in the principle manual of instruction, preserved in TCL VI 14: 'The place of Cancer: death in the ocean'[12] probably provided the background for Chrysippus' argument concerning the analysis of the conditional: 'If someone is born when Canicula (Sirius) is rising, he will not die in the ocean'[13]. This correlation, if correct, shows that the Babylonian science of birth omens was known in the Greek world by the late 3rd century B.C. Other Stoics of the second century B.C., such as Diogenes of Babylon and Panaetius of Rhodes, are said by Cicero[14] to have accepted in part or totally to have rejected the birth omens of the Chaldaeans; although Cicero, perhaps following Panaetius, seems to have Hellenized this 'astrology' somewhat, there is nothing in its basic procedures that cannot be paralleled in the cuneiform texts, and nothing also that must be interpreted as referring to Hellenistic genethlialogy. Nor do Cicero[15] and Augustine[16] clearly connect Posidonius with any specific doctrine of genethlialogy.

But Babylonian birth omens were probably known in Greek long before these Stoic philosophers debated about its validity. Eudoxus, according to Cicero[17], thought that one should not at all believe 'the Chaldaeans in their prediction and noting down of anyone's life from the day of birth'; this could be a reference to the 'proto-horoscopes' or to the nativity hemerologies;

published by Rochberg-Halton, 'Babylonian Horoscopes and their Sources', *cit.*, pp. 109-10, and some among nos. 1588-1630 in A.J. Sachs, *Late Babylonian Astronomical and Related Texts*, Providence 1955, pp. 256-68.

[12] Sachs, 'Babylonian Horoscopes', *cit.*, pp. 66 and 68.

[13] Cicero, *De fato* 6, 12, ed. R. Giomini, Leipzig 1975, p. 155.

[14] Cicero, *De divinatione* II 42 (87) - 47 (97), ed. R. Giomini, Leipzig 1975, pp. 119-23.

[15] Cicero, *De fato*, 3, 5-6, ed. Giomini, pp. 151-52.

[16] Augustinus, *De civitate Dei* V, 2 and 5, ed. E. Hoffmann, 2 vols., Wien 1899-1900, vol. 1, pp. 211-13 and 217.

[17] Cicero, *De divinatione* II 42 (87), ed., pp. 118-19.

and Proclus[18] cites Theophrastus as praising the theory of the Chaldaeans in his day which 'predicts the lives and deaths of individuals'. However one wishes to interpret these fragments attributed to Eudoxus and Theophrastus, the passage in Vitruvius[19] that attributes to Berosus (who wrote in about 290-280 B.C.) the successful teaching of genethlialogy in which the zodiacal signs and the planets are indicators of the native's fate can only be referring to the 'proto-horoscopes', though Pliny[20] goes too far in claiming that the Athenians set up a statue of Berosus with a gilded tongue because of his 'divine' predictions. The one astrological method ascribed to Berosus involves the use of the rising-times of Babylonian System A to determine the maximum life of a native to be 116 (= 40 + 40 + 36) years[21], but this methodology is totally foreign to everything that we yet know about Babylonian nativity omens; and so the two fragments seem to have been included correctly by Jacoby among those of pseudo-Berosus[22]. The same two fragments inform us that Epigenes claimed that the maximum human life-span is less than 112 years; this implies the use of the rising-times computed for Alexandria by Hypsicles in the second half of the second century B.C. according to System A also (38;20 + 38;20 + 35 = 111;40). I would suggest, then, that both pseudo-Berosus and Epigenes should be dated towards the end of the 2nd century or in the 1st century B.C.

Vitruvius in the passage cited above states that there was 'afterwards (Berosus') student, Antipater, and again Achinopolus, who left the reasons behind genethlialogy explained not from the nativity, but from the conception'. As we have seen, this is in full agreement with Mesopotamian practice. We know nothing more of these two followers of Berosus, but later on in the 3rd century we are informed of a Chaldaean *bāru* named Sudines who performed an extispicy of sorts for Attalus I of Pergamon before his victorious battle with the Gauls in about 235 B.C.[23]. Strabo includes him along with Cidenas and Naburianus among the noteworthy μαθηματικοί of Babylon[24]; and Sudines is quoted for the 'astrological' theory that Venus is the destroyer of women in the summary of a commentary, probably by

[18] Proclus, *In Platonis Timaeum* IV (285F), ed. E. Diehl, vol. 3, Leipzig 1906, p. 151.

[19] Vitruvius, *De architectura* IX 6, 2, ed. V. Rose, Leipzig 1899, pp. 229-30.

[20] Pliny, *Naturalis historia* VII 37 (123), ed. C. Mayhoff, vol. 2, Leipzig 1909, p. 42.

[21] Pliny, *Naturalis historia* VII 49 (160), ed. Mayhoff, vol. 2, p. 55, and Censorinus, *De die natali* 17, 4, ed. N. Sallmann, Leipzig 1983, p. 33. For System A see *HAMA*, vol. 1, pp. 368-69, and vol. 2, pp. 715-21.

[22] F. Jacoby, *Die Fragmente der griechischen Historiker*, 3C, Leiden 1958, p. 397 (F22a and b).

[23] Polyaenus, *Strategemata* IV 20, ed. I. Melber, Leipzig 1887, p. 219; cf. Frontinus, *Strategemata* I 11, 15, ed. R.I. Ireland, Leipzig 1990, p. 27, who names the king Eumenes, presumably intending Eumenes II, Attalus' son.

[24] Strabo, *Geographica* XVI 1, 6, ed. A. Meinecke, vol. 3, Leipzig 1904, p. 1030.

Posidonius, on Plato's *Timaeus*[25]. Thus there exist sufficient indications that at least in the 3rd century B.C. in Asia Minor, and probably already in the 4th century in Athens, something was known about Mesopotamian birth omens; and that the philosophical issues they raise concerning fate were debated among Stoics in the late 3rd and 2nd centuries B.C. Also in the 2nd century — in about its middle — appear a few indications of Greek elaborations on Mesopotamian astral divination. 'Hipparchus and the ancient (astrologers) of the Egyptians' are said by Hephaestio of Thebes to have described a system in which different countries are under the influence of parts of the constellations forming the twelve zodiacal signs[26]. This idea may have been suggested by the Babylonian system of associating months with countries. Firmicus Maternus informs us that Fronto followed the *antiscia* of Hipparchus, which related the degrees in the ecliptic from Cancer 1° to Sagittarius 29° to those from Capricorn 1° to Gemini 29°[27]; there is nothing that we know like this in Babylonian astral omens. Neugebauer suggests that Hipparchus' use of the term *antiscia* may have been in connection with the *antiscion* referred to in treatises on the sun dial and may have had nothing to do with 'astrology'[28].

Contemporary with Hipparchus was a work on celestial omens closely related to those of *Enūma Anu Enlil*, but presented under the fictitious authorship of Petosiris[29]. This treatise evidently included a section on computing the date of the native's conception[30], which seems to be an elaboration of the Babylonian method based on the position of the Moon. Attributed to this

[25] F. Lasserre, 'Abrégé inédit du commentaire de Posidonios au *Timée* de Platon (PGen inv. 203)', *Protagora, Antifonte, Posidonio, Aristotele*, Firenze 1986, pp. 71-127; see also W. Hübner, 'Zum Planetenfragment des Sudines (Pap. Gen inv. 203)', *ZPE*, 73, 1988, pp. 33-42; Id. 'Nachtrag zum Planetenfragment des Sudines. P. Gen. inv. 203', *ibid.*, pp. 109-10.

[26] Hephaestio, *Apotelesmatica* I 1, 7 (Aries) and 162 (Sagittarius), ed. D. Pingree, Leipzig 1973, pp. 4 and 22; see also I 1, 27 (Taurus), 46 (Gemini), 85 (Leo), 104 (Virgo), 143 (Scorpius), 182 (Capricorn), 201 (Aquarius), and 220 (Pisces), ed. Pingree, pp. 6-7, 8-9, 13, 15, 19, 24-25, 27, and 29, though some of these may derive from the similar system ascribed to Odapsus; see Hephaestio, I 1, 65 (Cancer), 123 (Libra), 163 (Sagittarius), and 221 (Pisces), ed. Pingree, pp. 10-11, 17, 22, and 29.

[27] Firmicus Maternus, *Mathesis* II praef., 2, ed. W. Kroll & F. Skutsch, vol. 1, Leipzig 1897, p. 40.

[28] *HAMA*, vol. 1, p. 331.

[29] D. Pingree, 'Pseudo-Petosiris', in *DSB*, vol. 10, New York 1974, pp. 547-49. Most of the fragments were assembled, though without awareness of their disparate sources, by E. Riess, 'Nechepsonis et Petosiridis fragmenta magica', *Philologus*, Suppl. 6, 1892, pp. 327-94.

[30] See Porphyrius, *Introductio*, 38, 2, ed. E. Boer & S. Weinstock, *CCAG*, V 4, Bruxelles 1940, pp. 185-228, at p. 210; Hephaestio II 1, 9, ed. Pingree, p. 82, and III 10, 5, ed. Pingree, p. 266; and cf. Proclus, *In Platonis Rem publicam*, ed. W. Kroll, vol. 2, Leipzig 1901, p. 59.

collection by Riess[31] is a chapter of Hephaestio of Thebes' *Apotelesmatica*[32], which was written in the early 5th century A.D., even though Hephaestio only mentions as his source 'the ancient Egyptian wise men'. The chapter makes annual predictions from the position of the planets at the heliacal rising of Sothis (Sirius). In this chapter is a paragraph[33] in which the distances of the planets from the earth are taken into consideration, with the farther planet transmitting its effects to the nearer until the Moon transmits them all to the earth, as well as each planet's own changing distance from the earth due to its traveling on an eccentric or an epicycle or both, and the five star-planets' stationary points. This reflects a stage in the development of Greek mathematical astronomy that certainly does not antedate the 2nd century B.C., though that does not prove either that this paragraph was an original part of the work of the 'ancient Egyptians' relied upon by Hephaestio or that that work was identical with the omen book of pseudo-Petosiris.

In any case, by the 1st century B.C. 'horoscopes' begin to appear in Greek, and to be mentioned in Latin literature. The earliest datable example is for a nativity on 21(?) January 72 B.C., that would have been computed many years later[34]; the next is that on the relief of a lion, representing the constellation Leo, carved for Antiochus I of Commagene at Nimrud Dagh; on the lion are depicted the nineteen stars of the constellation Leo, the Moon, Jupiter (near the head), Mercury (in the center), and Mars (near the tail). Neugebauer and Van Hoesen[35] have dated this 'horoscope' 6 or 7 July 62 B.C. and have argued that it refers to the recognition by the Romans of Antiochus' rule over Commagene. It is not, then, a birth 'horoscope' or even a Mesopotamian nativity omen, but rather an application of the idea of celestial omens of this form (i.e., the presence of planets in a zodiacal sign) to a political event.

However, sometime in the late 2nd or early 1st century B.C. someone, perhaps in Egypt, invented genethlialogical astrology, which assumes an Aristotelian universe in which the earth at the center, consisting of the four sublunar elements, is surrounded by the eternally circling spheres of the seven planets in the so-called Hellenistic order (Moon, Mercury, Venus, Sun, Mars, Jupiter, Saturn). This author also assumed the ability to compute the longitudes of the planets and the rising-point of the ecliptic for any given

[31] As fragment 12 on pp. 351-55.
[32] Hephaestio, *Apotelesmatica* I 23, ed. Pingree, pp. 66-73.
[33] *Ibid.* I 23, 8-11, ed. Pingree, pp. 67-68.
[34] O. Neugebauer & H.B. Van Hoesen, *Greek Horoscopes*, Philadelphia 1959, pp. 76-78.
[35] *Ibid.*, pp. 14-16.

time, and to divide the ecliptic into the twelve astrological places. To each of these twelve places he assigned an aspect of the native's life (life, wealth, siblings, parents, children, sickness, marriage, death, travels, occupation, gain, and loss; the first eight are sometimes treated as a set). Furthermore, each of the planets and each of the zodiacal signs was endowed with certain characteristics and influences over particular components of man and of the sublunar world in general; and the planets were endowed with rulership over the zodiacal signs and their parts (the decans or thirds, the *dodecatemoria* or twelfths, and the terms), and they influenced each other and the astrological places by means of either conjunction with them or aspect (sextile to 60°, quartile to 90°, trine to 120°, and opposition to 180°). While many further particulars were added to this collection of indicators, and some modifications were made, this is the basic set of assumptions that astrologers rely upon.

Some elements in addition to the central idea of predicting the life of a native from celestial phenomena came to the Greeks from Mesopotamia[36]. The signs in which the planets have their exaltations according to the Greeks were Aries for the Sun, Taurus for the Moon, Cancer for Jupiter, Virgo for Mercury, Libra for Saturn, Capricorn for Mars, and Pisces for Venus; the same regions of the ecliptic contain the *ašar niṣirtī* or secret places of the planets in cuneiform celestial omen texts beginning in about 700 B.C. Presumably the distribution is based on the seasons: Venus, the Sun, and the Moon, a common Babylonian triad, are associated with spring; they are opposite to Mercury and to Saturn (the latter being known as 'the Star of the Sun'), which are associated with autumn; and the benefic Jupiter in summer faces the malefic Mars in winter[37]. As just indicated, the Babylonians considered some planets to be benefic and others malefic[38]; the Greeks followed them in this, making Jupiter and Venus benefics, and Saturn and Mars malefics. From the Babylonian point of view this division is in accordance with the deities whose manifestations these planets are considered to be; for Jupiter is Marduk and Venus Ištar, both normally benign gods, while Saturn is Ningiršu, the god of windstorms, and Mars is Nergal, the god of the underworld. The Mesopotamian names, as that of Mercury's god, Nabū, were recognized by Philip of Opus in the *Epinomis* to be the origin of the Greek

[36] F. Rochberg-Halton, 'Elements of the Babylonian Contribution to Hellenistic Astrology', *JAOS*, 108, 1988, pp. 51-62.

[37] H. Hunger & D. Pingree, *MUL.APIN. An Astronomical Compendium in Cuneiform*, *AfO*, *Beiheft* 24, Horn 1989, pp. 146-47.

[38] F. Rochberg-Halton, 'Benefic and Malefic Planets in Babylonian Astrology', in *A Scinetific Humanist. Studies in Memory of Abraham Sachs*, Philadelphia 1988, pp. 323-28.

names of the planets[39]. In the *Sin* section of *Enūma Anu Enlil*, in Tablet 20[40], lunar eclipses are associated with the four geographical directions according to four sets of three months each spaced as are the zodiacal signs in the four triplicities of the Greeks, which are the groups Aries, Leo, and Sagittarius (associated by the Greeks with fire), Taurus, Virgo, and Capricorn (associated with earth), Gemini, Libra, and Aquarius (associated with air), and Cancer, Scorpio, and Pisces (associated with water). The triplicities, in fact, are explicitly attributed to the Chaldaeans by Geminus in his *Introduction to (astronomical) phenomena*, who also associates them with the four cardinal directions[41]. The zodiacal signs themselves, of course, where developed as a convenient measuring device for the longitudes of the planets by the Babylonians in the late 5th century B.C., and are perhaps referred to already by Plato[42], though named and described first by Eudoxus[43]. In later cuneiform texts appears the mini-zodiac in which each zodiacal sign is divided into twelve equal parts of 2-1/2° each, and each of these sub-sections is called by the name of one of the twelve signs[44]. These are the *dodecatemoria* used by Greek astrologers, especially in order to modify the influence of the Moon by associating it with another zodiacal sign in addition to the one it happens to occupy. Also in the Seleucid and Parthian periods, in tablets found at Uruk, there occur elements of Greek genethlialogy, such as the aspects of a native's life influenced by the individual zodiacal signs, the masculinization and feminization of the planets, and the planetary *melothesia*, and some traces of catarchic astrology dependent on the zodiacal sign occupied by the Moon[45]. In some cases it is clear that the Chaldaeans have adopted this material from the Greeks since the texts have such clear traces as calling the first sign the Ram instead of the Hired Man as was universally done in previous cuneiform texts; but in other cases it is not yet clear whether these late Babylonian texts or their Greek counterparts are the originals. The general outline of the relationships between Mesopotamian celestial omens and Hellenistic astrology are quite clear; but many questions about the details

[39] *Epinomis* 986e-987d in L. Tarán, *Academica: Plato, Philip of Opus, and the Pseudo-Platonic* Epinomis, Philadelphia 1975, pp. 196-97.

[40] *ABCD*, pp. 323 (text f., rev. 3-4) and 27.

[41] Geminus, *Introductio* II 7-11 with II 4, ed. C. Manitius, Leipzig 1898, pp. 20 and 22.

[42] Plato, *Phaedrus* 246e-247c, ed. I. Burnet, *Platonis opera*, vol. 2, Oxford 1901.

[43] There are frequent refences to Eudoxus' descriptions of the constellations with respect to zodiacal signs in the fragments of his *Phaenomena* and *Enoptron*; see F. Lasserre, *Die Fragmente des Eudoxos von Knidos*, Berlin 1966, pp. 38-67, esp. fragment 9 (p. 41), from Hipparchus, and the fragments mentioned by Lasserre in connection with it.

[44] O. Neugebauer & A. Sachs, 'The "Dodecatemoria" in Babylonian Astrology', *AfO*, 16, 1952-1953, pp. 65-66.

[45] E. Reiner, *Astral Magic in Babylonia*, Philadelphia 1995, pp. 108-12.

remain unanswered because of the loss of so much of the relevant Greek material of the last four centuries B.C. and the scantiness of the cuneiform texts from the same period. But we can yet hope that new discoveries among the papyri and the tablets will offer the solutions to the remaining problems without posing too many new ones.

CHAPTER 3
BABYLONIAN OMENS AND GREEK ASTROLOGY IN INDIA

The influence of Babylonian astronomy on Indian thought is already perceptible in Sanskrit texts of the first half of the last millennium B.C.[1]; and so the earliest omen texts in India — *kaṇḍikās* 93-136 of the *Kauśikasūtra*[2] of the *Atharvaveda* and the common source[3] of the *Adbhutabrāhmaṇa*[4] (which is *adhyāya* VI or V of the *Ṣaḍviṃśabrāhmaṇa*), IV 11-22 of the *Āśvalāyanagṛhyapariśiṣṭa*[5], and the *Adbhutaśānti*[6] of the *Atharvavedapariśiṣṭas* — may well also have been influenced by Babylonian omens. In both sources the emphasis is upon the *śānti* (pacification) rituals by which the anger of the god who sent the omen is appeased; these are clearly parallel to the

[1] D. Pingree, 'MUL.APIN and Vedic Astronomy', *DUMU-E$_2$-DUB-BA-A. Studies in Honor of Åke W. Sjöberg*, Philadelphia 1989, pp. 493-45.

[2] M. Bloomfield, 'The Kāuçika-sūtra of the Atharva-veda', *JAOS*, 14, 1890, pp. i-lxviii and 1-415, esp. pp. 247-89; reprinted Delhi 1972. For a general account of celestial omens in India see D. Pingree, *Jyotiḥśāstra*, Wiesbaden 1981, pp. 67-80.

[3] N. Tsuji, 'On the Formation of the Adbhuta-Brāhmaṇa', *ABORI*, 48-49, 1968, pp. 173-78.

[4] *Ṣaḍviṃśabrāhmaṇa with Vedārthaprakāśikā of Sāyaṇa*, ed. B.R. Sharma, Tirupati 1967, pp. 195-225 (*adhyāya* 6), translated by W.B. Bollée, *Ṣaḍviṃśa-Brāhmaṇa*, Utrecht 1956, pp. 104-12 (*adhyāya* V).

[5] *Aśvalāyanagṛhyapariśiṣṭa* IV 11-22 in *Āśvalāyanagṛhyasūtra*, ed. G. Gokhale, Poona 1978, pp. 192-95.

[6] Pariśiṣṭa LXVII in *The Pariśiṣṭas of the Atharvaveda*, ed. G.M. Bolling & J. von Negelein, vol. 1, 2 parts, Leipzig 1909-1910, pt. 2, pp. 432-37.

Babylonian *namburbis*. In the second source the omens sent by Vāyu, the god of the wind, include the shapes of animals seen in the clouds, rains of dust or blood, and palaces in the air[7], those sent by Soma include the falling of meteors, the glowing of the quarters, and comets[8], and those sent by Viṣṇu include halos about the Sun and the Moon[9]. All of these omens are familiar from the protases of *Enūma Anu Enlil*, as are many of the other, terrestrial omens in this source from the protases of the Babylonian omen series *Šumma ālu*[10].

The dates of the two sources mentioned above remain uncertain, though they must have been composed in about the middle of the last millennium B.C., either shortly before or shortly after the Achaemenid occupation of Gandhāra, which must have occurred before Darius caused the Behistun inscription to be incised in about 520 B.C. In the early 4th century B.C., since his *nirvāṇa* seems to have occurred in about 350 B.C.[11], the Buddha is alleged to have delivered a sermon, the *Brahmajālasutta*, that is included in the *Dīghanikāya*[12]; in this sermon he castigates the immoral activities engaged in by some Śramaṇas and Brāhmaṇas in return for food[13]. Some of these activities involve various forms of sacrifices and the expelling of demons and other undesirable beings; but a large number are concerned with various forms of divination. Almost every type of omen mentioned by the Buddha is found in both the earlier cuneiform literature and in the later Sanskrit texts; and the terrestrial omens are enumerated in an order — houses, ghosts, snakes, poisons, scorpions, mice, vultures, crows, and quadrupeds — that corresponds almost completely with the order of the Tablets of *Šumma ālu*[14]. The Buddha also lists in his sermon a number of celestial and atmospheric omens: lunar eclipses, solar eclipses, observations of the stars (*nakhatta* = *nakṣatra*, probably including the planets here), the Moon's and the Sun's

[7] *Adbhutabrāhmaṇa* 8, ed. pp. 212-14; *Āśvalāyanagṛhyapariśiṣṭa* IV 17, ed. p. 193; and *Atharvavedapariśiṣṭa* LXVII 7, 1-5, ed. p. 434.

[8] *Adbhutabrāhmaṇa* 9, ed. pp. 215-16; and *Āśvalāyanagṛhyapariśiṣṭa* IV 19, ed. p. 194; omitted in *Atharvavedapariśiṣṭa* LXVII.

[9] *Adbhutabrāhmaṇa* 10, ed. pp. 217-21; *Āśvalāyanagṛhyapariśiṣṭa* IV 21, ed. p. 194; and *Atharvavedapariśiṣṭa* LXVII 6, 1-7, ed. p. 434.

[10] There is an incomplete edition by F. Notscher, *Haus-und Stadt Omina*, 3 vols., Rome 1928-1930; a useful survey is provided by S. Moren in her 1978 Ph.D thesis submitted to the University of Pennsylvania, *The Omen Series "Summa alu" : A Preliminary Investigation*.

[11] H. Bechert, 'The Date of the Buddha Reconsidered', *IT*, 10, 1982, pp. 29-36.

[12] *Dīghanikāya* i 1, 1-3, 74, ed. T.W. Rhys Davids & J.E. Carpenter, vol. I, London 1890, pp. 1-46.

[13] *Dīghanikāya* i 1, 21-27, ed. pp. 9-12.

[14] D. Pingree, 'Mesopotamian Omens in Sanskrit', *La circulation des biens, des personnes et des idées dans le Proche-Orient ancien*, Paris 1992, pp. 375-79.

going on and off their paths (probably those familiar from *Enūma Anu Enlil*, the Paths of Enlil, Anu, and Ea), the stars' going on their paths, the falling of meteors and shooting stars, the 'burning of the directions' (i.e., a glow on the horizon), earthquakes, thunder, and the risings, the settings, the brightness, and the dimness of the Moon, the Sun, and the stars. Clearly the Buddha (or at least the author, who must be early, of the *Brahmajālasutta*) was very familiar with the contents of both *Šumma ālu* and *Enūma Anu Enlil*. Though much work needs to be done in comparing the specific omens in the Sanskrit tradition — especially those in the as yet unpublished earliest *Gargasaṃhitā*[15], which was written in about 100 A.D. — with the cuneiform texts, which are also to a large extent unpublished, it is clear that in the 5th and early 4th century B.C. much of the Mesopotamian omen literature, perhaps from Aramaic versions, was translated into an Indian language, and that these translations, though undoubtedly considerably altered to fit with Indian intellectual traditions and with the Indian society which the diviners had to serve, form the basis of the rich Sanskrit and Prakrit literatures on terrestrial and celestial omens. They thus parallel the contemporary Babylonian influence on early Indian mathematical astronomy[16].

Thus the Babylonian astral sciences, in a form that they had reached in the Achaemenid period, before the remarkable developments in astronomy, or the less remarkable ones in omens, of the Seleucid period, became the foundations of Indian *jyotiḥśāstra*. With the intensification of direct trade by sea between Egypt and India in the late 1st century B.C. under the auspices of the Roman Empire, and the establishment of Greek colonies in India, the possibility of a direct transmission of both Hellenistic astrology and astronomy emerged; and it is clear from the Indian texts of the 3rd through the 6th centuries A.D. that many Greek texts in both sciences were rendered into Sanskrit. For the influence of Greek astronomy[17] we rely primarily on the *Paitāmahasiddhānta* of the *Viṣṇudharmottarapurāṇa*[18], written in *c.* 425;

[15] For this version of the *Gargasaṃhitā* see D. Pingree, *Census of the Exact Sciences in Sanskrit*, Series A, vols. 1-5, Philadelphia 1970-1994, A 2, 116a-117b; A 3, 29b; A 4, 78a; and A 5, 78b. See also D. Pingree, 'Venus Omens in India and Babylon', *Language, Literature, and History*, New Haven 1987, pp. 293-315.

[16] D. Pingree, 'The Mesopotamian Origin of Early Indian Mathematical Astronomy', *JHA*, 4, 1973, pp. 1-12; Id., 'Babylonian Planetary Theory in Sanskrit Omen Texts', *From Ancient Omens to Statistical Mechanics*, Copenhagen 1987, pp. 91-99.

[17] D. Pingree, 'The Recovery of Early Greek Astronomy from India', *JHA*, 7, 1976, pp. 109-23; Id., 'History of Mathematical Astronomy in India', *DSB*, vol. 15, pp. 533-633.

[18] *CESS*, A 4, p. 257a; D. Pingree, 'The Purāṇas and Jyotiḥśāstra: Astronomy', *JAOS*, 110, 1990, pp. 274-80; and D. Pingree & P. Morrissey, 'On the Identification of the *Yogatārās* of the Indian *Nakṣatras*', *JHA*, 20, 1989, pp. 99-119.

the *Āryabhaṭīya* of Āryabhaṭa[19], written in *c.* 500; and the *Pañcasiddhāntikā* of Varāhamihira[20], written in *c.* 550. For the origin of *jātaka* or genethlialogy in Greek astrology[21], on the other hand, we rely primarily on the *Yavanajātaka* of Sphujidhvaja[22], written in 269/270; the *Vṛddhayavanajātaka* of Mīnarāja[23], written in *c.* 300-325; and the *Bṛhajjātaka* of Varāhamihira[24], written in *c.* 550, with the commentary on it, *Jagaccandrikā*, composed by Bhaṭṭotpala[25] in *c.* 970.

Sphujidhvaja's *Yavanajātaka* is a versification of a Sanskrit translation of a Greek astrological treatise; the Greek original was written in Egypt, probably in Alexandria, toward the beginning of the 2nd century A.D., and was turned into Sanskrit by someone bearing the title Yavaneśvara, 'Lord of the Greeks', in 149/150. The most likely locale for this translation is Ujjayinī under the rule of the Mahākṣatrapa, Rudradāman I, a prominent member of a Śaka dynasty in whose kingdom Greek influence was extremely strong. This conjecture is strengthened by the fact that it was Rudradāman who initiated the use of a mathematically determined calendar which was made possible by the Greco-Babylonian astronomy taught in the *Yavanajātaka*[26]. The facts that Sphujidhvaja is also a *rājā* (presumably a Yavanarāja)[27] and that Mīnarāja is a Yavanādhirāja[28] indicate that they came from the same social *milieu*, that of the kingdom of the Western Kṣatrapas, as had Yavaneśvara; the title was also borne, in the form Yorāji, by the ruler of Sañjayapura (Sañjan?) in about 330.

The prime indisputable evidence that the *Yavanajātaka* is indeed influenced by Greek astrology is the presence in it of a large number of technical terms that are simply transliterations of their Greek equivalents.

anapharā (X 1, 4, and 13-17) = ἀναφορά (when the Moon has passed a planet; usually called ἀπόρροια).

[19] *CESS*, A 1, pp. 50b-54a; A 2, p. 15b; A 3, p. 16a; A 4, p. 27b, and A 5, pp. 16a-17a; see also D. Pingree, 'Aryabhaṭa, the Paitāmahasiddhānta, and Greek Astronomy', *SHMS*, NS, 12, 1993, pp. 69-79.

[20] *CESS*, A 5, pp. 563a-564b.

[21] Pingree, *Jyotiḥśāstra*, *cit.*, pp. 81-100.

[22] Sphujidhvaja will be included in *CESS*, A 6; for now see D. Pingree, *The Yavanajātaka of Sphujidhvaja*, *HOS*, 48, 2 vols., Cambridge, Mass. 1978.

[23] *CESS*, A 4, pp. 427a-429b, and A 5, pp. 310a-310b. I refer to the edition by D. Pingree, *The Vṛddhayavanajātaka of Mīnarāja*, *GOS*, 162-163, Baroda 1976.

[24] *CESS*, A 5, pp. 573a-587b. I refer to the edition with the *ṭīkā* of Bhaṭṭotpala by Govinda Devasthali, Mumbaī Saṃ. 1983 = A.D. 1926.

[25] *CESS*, A 4, pp. 272a-275a; and A 5, pp. 246b-247a.

[26] In *adhyāya* LXXIX; see D. Pingree, 'A Note on the Calendars Used in Early Indian Inscriptions', *JAOS*, 102, 1982, pp. 355-359.

[27] *Yavanajātaka* LXXIX 62, ed. vol. 1, p. 506.

[28] *Vṛddhayavanajātaka* LXVII 1, ed. vol. 2, p. 374.

āpoklima (I 53 and 94) = ἀπόκλιμα (cadent: the third, sixth, ninth, and twelfth places).

daurudhura (X 1, 5, and 18-27) = δορυφορία (when the Moon is between two planets).

drekāṇa (I 34 and 39; III; XXIII 6-9; XXVII 2 and 5-8; and XXIX) = δεκανός (third of a zodiacal sign; or Decan).

hipaka (I 48) = ὑπόγειον (the fourth place).

horā (I 31, 34, 39, and 48; II; XXVIII; and LXXVI 49-50) = ὥρα (ascendent; half of a zodiacal sign; or Horā).

jāmitra (I 49) = διάμετρος (the seventh place).

kemadruma (X 2 and 6) = κενοδρομία (when there is no planet before or behind the Moon).

kendra (I 53) = κέντρον (cardine: the first, fourth, seventh, and tenth places).

liptā (LXXIX 28) and *liptaka* (I 38 and 43) = λεπτόν (minute of arc).

meṇyaiva (I 50) = μηνιαῖος (lunar).

meṣūraṇa (I 49) = μεσουράνημα (midheaven).

pāṇaphara (I 53) = ἐπαναφορά (succedent: the second, fifth, eighth, and eleventh places).

sunaphā (X 1, 3, and 8-12) = συναφή (when the Moon approaches a planet).

trikoṇa (I 51) = τρίγωνον (trine; the fifth place. The ninth place is called '*tritrikoṇa*').

vāśi (XI 1, 3, and 6-7) = φάσις (rising).

When we examine the doctrines of the *Yavanajātaka*, and compare them with those of the surviving Greek and Latin texts, we find that the former are indeed derived from the latter both in terms of the predicters and of the predictions, though the Indians have modified both in many instances to make them fit into their own traditions. This is not the place to discuss these dependencies and divergences in detail; that has been done elsewhere[29], where I also demonstrated that the *Yavanajātaka* is the basis of almost all of the Indian tradition of astrology. At this point I would only draw the reader's attention to a fact that nicely illuminates the way in which Indian culture influenced the Greek material that it absorbed. The manuscript translated by Yavaneśvara was adorned with pictures of the *Horās* and *Decans* based on a Greek interpretation of Egyptian originals; these pictures, which are described in Sanskrit in *adhyāyas* II and III of the *Yavanajātaka*, were understood as representations of Śiva and Pārvatī[30].

After his coverage of genethlialogy in *adhyāyas* I to LI Sphujidhvaja has

[29] Pingree, *The Yavanajātaka*, *cit.*, vol. 2, pp. 195-415.

[30] D. Pingree, 'The Indian Iconography of the Decans and Horās', *JWCI*, 26, 1963, pp. 223-54.

added a section on interrogations (*praśnaśāstra*[31]) in *adhyāyas* LII to LXXII. This branch of astrology was an Indian invention, drawing upon both *jātaka*, for the subjects of the query, and Greek catarchic astrology, for the answer; if not devised by Sphujidhvaja himself, he must have been able to derive it from some Indian astrologer writing in the century before he composed the *Yavanajātaka*. The difference between catarchic and interrogational astrology is that with the former the astrologer determines a propitious time for his client to begin doing something, while with the latter he answers a specific question from the horoscope of the moment at which the question was asked. Interrogations, as will be made clear in chapters 4 and 6, were an important contribution by Indians to later astrologies; so also was military astrology, (*yātrā*[32]), which is based on a combination of omens with catarchic astrology. Sphujidhvaja inaugurates the long Indian tradition of the mixed form of this type of astrology in *adhyāyas* LXXIII to LXXVI, while he deals with catarchic astrology itself (*muhūrtaśāstra*[33]) briefly in *adhyāyas* LXXVII-LXXVIII.

Mīnarāja, who copies or repeats many of Sphujidhvaja's verses, restricts most of the *Vṛddhayavanajātaka* to genethlialogy (*adhyāyas* I-LXIII), but appends eight chapters on omens at the end. Much of what he has added to the genethlialogy of the *Yavanajātaka* seems to have been derived from the lost work of Satya, who appears to have been able to draw upon a second translations of a Greek astrological work as well as upon Yavaneśvara's[34]; clearly Satya must be dated to the 3rd century. The main innovations made by Mīnarāja in the field of genethlialogy were the development of a special field of women's horoscopy (*strījātaka*) in *adhyāyas* LVIII-LXII and the theory of the rays (*raśmi*) of the planets expounded in *adhyāya* LVI; these rays are a measure of the distance of each planet from its exaltation, and therefore only express in a new way an old idea.

Varāhamihira, while normally following Sphujidhvaja or Satya in his *Bṛhajjātaka* (he refers to Satya by name in II 15; VII 9, 10, and 13; XII 2; XX 20; and XXI 3, but never by name to Sphujidhvaja despite his echoing of Sphujidhvaja's words from time to time), depends on many other authorities as well. He cites at various points the opinions of Jīvaśarman[35] (VII 9

[31] See Pingree, *Jyotiḥśāstra*, *cit.*, pp. 110-14.

[32] *Ibid.*, pp. 107-8.

[33] *Ibid.*, pp. 101-7.

[34] See *The Yavanajātaka*, *cit.*, vol. 2, pp. 198, 207, 209, 210, 224, 236, 240, 241, 246, 273, 275, 293, 331, 333, 339, 348, and 354. For Satya's use of Yavaneśvara see *ibid.*, vol. 2, pp. 299 and 337-38.

[35] *CESS*, A 3, p. 70a.

and XI 1), Devasvāmin[36] (VII 7), Parāśara[37] (XII 2), Bhadatta[38] (VII 11), Maya[39] (VII 1), Viṣṇugupta[40] (VII 7 and XXI 3), Śaktipūrva[41] (VII 1), and Siddhasena (VII 7), all of whom seem to have written in the 4th or 5th century. It is apparently Mīnarāja whom he refers to as Yavanāḥ in XII 1[42], but his other references to the Yavanas are either to the lost translation used by Satya (XXI 3[43]) or to another lost translation from the Greek (VIII 9[44] and XI 1). And in VII 1 he refers separately to Yavana[45] and to Maṇittha[46], whose name represents the Greek Μανέθων, alleged author of a Greek astrological poem in six books, though most of the fragments of his lost Sanskrit treatise are highly Indianized. Bhaṭṭotpala[47] carefully distinguishes this Yavana, whose work he has not seen but whom, because of his agreement with Satya, he assumes to be identical with Yavaneśvara, from Sphujidhvaja. One or the other or both of the lost translations may have been known to Govindasvāmin[48], who, in the early 9th century, was able to quote verses from Yavanācārya, Yavaneśvara, and Cirantanayavana[49], as well as from Maṇittha and Sphujidhvaja.

Varāhamihira's acquaintance with Greek sources other than that used by Sphujidhvaja is further proved by his use in the *Bṛhajjātaka* of Sanskrit transliterations of Greek technical terms other than those found in the *Yavanajātaka*. These are:

ākokera (I 8) = Αἰγόκερως (Capricorn).
āra (II 2; V 14; XI 18; XXIII 14; and XXVI 9) = Ἄρης (Mars).
āsphujit (II 3; XXIV 15; and XXVI 9) = Ἀφροδίτη (Venus).
ittha (I 8; perhaps Varāhamihira wrote *iktha*) = Ἰχθύς (Pisces).
karki (I 10; V 20; XI 9; and XXIII 9) = Καρκίνος (Cancer).
koṇa (II 2) = Κρόνος (Saturn).
kaurpya (I 8) = Σκορπίος (Scorpius).
kriya (I 8; III 3; V 21; XI 10; XVII 1; XVIII 1; and XXVI 9) = Κριός (Aries).

[36] *CESS*, A 3, p. 121b.
[37] *CESS*, A 4, p. 199a.
[38] According to Bhaṭṭotpala on *Bṛhajjātaka* VII 11 Bhadatta is identical with Satya.
[39] *CESS*, A 4, p. 358b.
[40] *CESS*, A 5, p. 704a.
[41] Śaktipūrva is identical with Parāśara according to Baṭṭotpala on *Bṛhajjātaka* VII 9.
[42] Pingree, *The Yavanajātaka*, *cit.*, vol. 2, pp. 330-31.
[43] *Ibid.*, vol. 2, pp. 292-93.
[44] *Ibid.*, vol. 2, p. 345.
[45] *Ibid.*, vol. 2, p. 335.
[46] *CESS*, A 4, p. 343b.
[47] Pingree, *op. cit.*, vol. 2, pp. 337-38.
[48] *CESS*, A 2, p. 144a; A 4, p. 86b; and A 5, p. 101a.
[49] *CESS*, A 5, p. 325b.

jituma (I 8 and XXVI 9) = Δίδυμοι (Gemini)
jūka (I 8; XIX 2; and XXV 8) = Ζυγόν (Libra).
tāvuri (I 8) = Ταῦρος (Taurus).
taukṣika (I 8) = Τοξότης (Sagittarius).
dyūna (I 16; XXIII 3 and 13; XXIV 8 and 9) = δῦνον (descendent).
pāthona (I 8 and XXIII 1) = Παρθένος (Virgo).
leya (I 8) = Λέων (Leo).
hṛdroga (I 8) = Ὑδροχόος (Aquarius).
hemna (II 2) = Ἑρμῆς (Mercury).
heli (II 2) = Ἥλιος (Sun).

In conclusion we must note that Varāhamihira, as a Maga Brāhmaṇa, was subject not only to Greek influence, but to Iranian. This becomes apparent not in his astrology (for the Iranian astrology of the 6th century was shaped by Indian and Greek, as will be shown in the next chapter), but in his astronomical *Pañcasiddhāntikā*, wherein his list of the deities associated with the thirty days of each Persian month is developed from an Iranian list[50].

[50] This topic will be discussed in a forthcoming paper by A. Panaino.

CHAPTER 4
THE RECOVERY OF SASANIAN ASTROLOGY

Virtually the entire corpus of astrological texts that once existed in Pahlavī has long since disappeared[1]: of that which remains the chief passage is that on the horoscope of the world (*zāyč ī gēhān*) in the 9th century *Bundahishn*[2]. This is, in fact, as the nativity of Gayōmart, the Indian horoscope of a *mahāpuruṣa*, with the seven planets in the zodiacal signs of their exaltations, without any specification of their degrees within those signs, and without actually mentioning Mercury's position in Virgo, which is astronomically impossible[3]. The horoscope of the *mahāpuruṣa* first appears in the Sanskrit *Yavanajātaka* composed by Sphujidhvaja in 269/270 A.D.[4]. However, the Pahlavī adapter of this horoscope has made some additions, of which the main one is that the ascending and descending nodes of the Moon, which are referred to as the Head and Tail of the Dragon Gočihr (the Indian Rāhu and Ketu), are placed in Gemini and Sagittarius respectively; these exaltations of the nodes do not occur either in Classical Greek or in Indian

[1] There is a brief review of the Pahlavī material by C.J. Brunner, 'Astronomy and Astrology in the Sasanian Period', *EIr*, 2, pp. 862a-868b; see also D. Pingree, 'Māshā'allāh: Some Sasanian and Syriac Scources', *Essays on Islamic Philosophy and Science*, Albany 1975, pp. 5-14.

[2] D.N. Mackenzie, 'Zoroastrian Astrology in the *Bundahišn*', *BSOAS*, 27, 1964, pp. 511-29. Important as this article was in its time, it needs now to be thoroughly revised.

[3] In some versions of this *mahāpuruṣa* horoscope it is also stated that the Moon is full, which again is astronomically impossible since it is only one zodiacal sign from the Sun.

[4] *Yavanajātaka* VIII 5 and IX 2 in D. Pingree, *The Yavanajātaka of Sphujidvhaja*, *HOS*, 48, 2 vols., Cambridge, Mass. 1978.

astrology, but represent a Sasanian innovation based on the Indians' inclusion of the two nodes among the planets, which then number nine; this inclusion occurred only in the late 4th or 5th century, after Mīnarāja wrote his *Vṛddhayavanajātaka* between 300 and 325[5]. This indicates that the Pahlavī original of this horoscope of Gayōmart does not go back earlier than *c.* 500, and was probably proposed during the reign of Khusrō Anūshirwān, who ruled from 531 till 578.

Other Indian elements in this horoscope of a *mahāpuruṣa* include the references to the *nakṣatra* Azarag, corresponding to the Sanskrit Āśleṣā[6]; and the bonds that connect the five star-planets to the Sun remind one of the chords of wind that bind them to their *śīghroccas* (corresponding to the Sun) in Indian astronomy[7], though the lengths of the bonds for Venus and Mercury — 2831 = 47;11° and 1850, for which read 1350 = 22;30° respectively— are Venus' maximum equation of the anomaly according to the Sasanian *Zīk-i Shahriyārān* of Khusrō Anūshirwān[8] and the radius of Mercury's epicycle according to Ptolemy[9]. Thus, the idea advanced by Cumont that the Greek version of this horoscope, which calls it Chaldaean, represents some Babylonian prototype[10] (which is, in fact, totally inconceivable since the Babylonians did not cast horoscopes), is absurd; rather, the Greek is a most interesting Byzantine version of an Arabic description of the Zoroastrian horoscope of the world. That Arabic original, in fact, is preserved in, *inter alia*, the eighth book of ʿAlī ibn Abī al-Rijāl's *Kitāb al-bāriʿ* (*Book of the Skilled*)[11], where it is attributed to the *Kitāb al-bizīdāj* of Vettius Valens as commented upon by Buzurjmihr.

The other references to astrology in Pahlavī literature assure us that that science was widely practiced in Sasanian Iran; and those examples I have been able to examine indicate that among the types of astrology then in use was that of interrogations[12], an Indian invention based on Greek catarchic astrology but differing from it in the way described in chapter 3.

[5] D. Pingree, *Jyotiḥśāstra*, Wiesbaden 1981, p. 83.

[6] D.N. Mackenzie, *BSOAS*, 27, 1964, p. 514 n. 2.

[7] D. Pingree, 'Astronomy and Astrology in India and Iran', *Isis*, 54, 1963, pp. 229-46, esp. 242.

[8] See, e.g., E.S. Kennedy & D. Pingree, *The Astrological History of Māshā'allāh*, Cambridge, Mass. 1971, p. 82.

[9] Σύνταξις μαθηματική IX 9.

[10] In *CCAG*, 5, 2, p. 131; the Θεμέλιος ἀστρονομικῆς τέχνης κατὰ τοὺς Χαλδαίους δόξα was edited by I. Bidez, *CCAG*, 5, 2, pp. 130-37.

[11] *Kitāb al-bāriʿ* VIII 35, cited by C.A. Nallino, 'Tracce di opere greche giunte agli Arabi per trafila pehlevica', *A Volume of Oriental Studies Presented to Professor E.G. Browne*, Cambridge 1922, pp. 345-63, esp. 353. The same horoscope is referred to by Ḥamza al-Iṣfahānī (I 5) and pseudo-Hermes; see Pingree, 'Māshā'allāh', *cit.*, p. 12 n. 6.

[12] A. Panaino, 'The Two Astrological Reports of the *Kārnāmag ī Ardašīr ī Pābagān* (III, 4-7; IV, 6-7)', *Die Sprache* 36, 1994, pp. 181-98.

But, for the most part, we rely on Arabic translations of and references to the Pahlavī texts for our reconstruction. These translations from Pahlavī were virtually the earliest scientific texts in Arabic[13]; and early ʿAbbāsid astrology, like its astronomy[14], was largely Sasanian and Greek in origin, with Indian material entering in through its being intermingled with the Greek and Iranian elements in Sasanian astrology, while most of the practicing astrologers of the late eighth and early ninth centuries were Iranians. I need only name Nawbakht who came to al-Manṣūr's court as a Zoroastrian claiming descent from Gēv, but who then converted to Islām[15]; Māshāʾallāh ibn Atharī, a Persian Jew from Baṣra[16]; and ʿUmar ibn al-Farrukhān from Ṭabaristān[17], all three of whom were present at the casting of the catarchic horoscope of Baghdād for 30 July 762[18]; to them may be added al-Faḍl ibn Sahl from Sarakhs[19], Sahl ibn Bishr, a Jew who worked in Khurāsān[20], Abū Maʿshar of Balkh[21], and Abū Yūsuf Yaʿqūb ibn ʿAlī al-Qaṣrānī[22], to restrict ourselves to only the more important authorities who were Persians and who relied, directly or indirectly, on Pahlavī sources.

A number of genuine translations of Pahlavī books have survived, though there also are several Arabic texts that falsely claim to be such translations. The most noteworthy of the latter group, entitled *Kitāb ʿarḍ miftāḥ asrār al-nujūm* (*Book of the Latitude of the Key of the Secrets of the Stars*), is attributed to Hermes, and is said in the unique manuscript in the Ambrosiana[23],

[13] D. Pingree, 'Astrology', in *The Cambridge History of Arabic Literature: Religion, Learning and Science in the ʿAbbasid Period*, Cambridge 1990, pp. 290-300, esp. pp. 292-95.

[14] D. Pingree, 'The Greek Influence on Early Islamic Mathematical Astronomy', *JAOS*, 93, 1973, pp. 32-43.

[15] F. Sezgin, *Geschichte des arabischen Schrifttums*, vol. VII, Leiden 1979, pp. 100-1; for his claims to ancient Kayanian ancestry see D. Pingree, *EIr*, 1, pp. 369a-369b.

[16] E.S. Kennedy & D. Pingree, *op. cit.*; D. Pingree, *DSB*, vol. 9, New York 1974, pp. 159-62; *GAS*, VII, pp. 102-8; D. Pingree, 'Classical and Byzantine Astrology in Sasanian Persia', *DOP*, 43, 1989, pp. 227-39, and Id., 'Māshāʾallāh: Greek, Pahlavī, Arabic and Latin Astrology', to appear.

[17] D. Pingree, *DSB*, vol. 13, New York 1976, pp. 538-39; *GAS*, VII, pp. 111-13; and D. Pingree, 'The Liber Universus of ʿUmar Ibn al-Farrukhān al-Ṭabarī', *JHAS*, 1, 1977, pp. 8-12.

[18] D. Pingree, 'The Fragments of the Works of al-Fazārī', *JNES*, 29, 1970, pp. 103-23, esp. p. 104.

[19] *GAS*, VII, pp. 115-16.

[20] *GAS*, VII, pp. 125-28.

[21] R. Lemay, *Abū Maʿshar and Latin Aristotelianism in the Twelfth Century*, Beirut 1962; D. Pingree, *The Thousands of Abū Maʿshar*, London 1968, and *DSB*, vol. 1, New York 1970, pp. 32-39.; and *GAS*, VII, pp. 139-51.

[22] *GAS*, VII, pp. 138-9; and D. Pingree & W. Madelung, 'Political Horoscopes Relating to Late Ninth Century ʿAlids', *JNES*, 36, 1977, pp. 247-75.

[23] Ms. 342 (C 86), described by E. Griffini in *RSO*, 7, 1916-1918, pp. 110-27, ff. 1b-100a; see *GAS*, VII, pp. 53-4.

whose copying was finished on Friday 7 Rabīʿ al-awwal in 1071 A.H. or 12 November 1660, to have been translated in Dhū al-qaʿda in 125 A.H. or between 26 August and 24 September in 742. The text is a confused treatise on historical and political astrology based on permutations of the idea of the revolutions of the world-years (*sinī al-ʿālam*), a form of astrology that we shall see to have been invented and popular in Sasanian Iran. Bausani's notion that this text quotes from Abū Maʿshar's *Kitāb aḥkām taḥāwīl al-mawālīd*, composed in about 850, is unfounded[24], though he is certainly right to deny that the pseudo-Hermetic work was translated in 125 A.H. Of the dozen or so horoscopes that it contains, none yields a satisfactory date between 600 B.C. and 1600 A.D. except for one, whose date is incontrovertibly 24 March 1428[25]. This pseudo-Hermetic text is, then, triply bogus; it is neither by its alleged author, nor was it translated in 742, nor, indeed, was it a translation at all. It shows sign of being an Arabic forgery of the 15th or 16th century.

The same manuscript contains a fragment of a book on a familiar form of Sasanian historical astrology based on conjunctions of Saturn and Jupiter. This work[26] is attributed to Jamasb, and is claimed to have been translated from Pahlavī by Muḥammad ibn Abī Bakr al-Fārisī, who is probably the Muḥammad al-Fārisī who wrote in Arabic in the Yemen the *al-Zīj al-Muẓaffarī*

[24] A. Bausani, 'Il *Kitāb ʿArḍ Miftāḥ an-Nujūm* attribuito a Hermes: prima traduzione araba di un testo astrologico?', *Atti della Accademia Nazionale dei Lincei, Serie ottava, Memorie, Cl. Sci. mor., stor. e fil.*, 27, 1983, pp. 83-141, esp. pp. 89 and 126. Bausani does not realize that the *De revolutionibus nativitatum* published at Basel in 1559 is definitely a translation from the Greek version of Abū Maʿshar's *Kitāb taḥāwīl sinī al-mawālīd* edited by D. Pingree, Leipzig 1968; nor that the style of the *Kitāb ʿarḍ miftāḥ al-nujūm* is totally foreign to that of Abū Maʿshar.

[25] Bausani's attempt (*op. cit.*, pp. 85-89) to discuss the dates of some of the horoscopes is quite useless. The horoscope of 24 March 1428 is found on f. 62a; see Bausani, *op. cit.*, p. 129.

Planets	Ambrosiana ms.	Computation
Saturn	Sagittarius	Sagittarius 21° retr.
Jupiter	Aquarius	Aquarius 20°
Mars	Aries	Aries 7°
Sun	Aries	Aries 13°
Venus	Aries	Aries 27°
Mercury	Pisces	Pisces 19°
Moon	Cancer	Cancer 18°
Ascending node	Aries	Aries 23°

The positions of the planets are taken from B. Tuckerman, *Planetary, Lunar, and Solar Positions A.D. 2 to A.D. 1649*, Philadelphia 1964; the position of the ascending node from P.V. Neugebauer, *Sterntafeln von 4000 vor Chr. bis zu Gegenwart*, Leipzig 1912, pp. 68-76.

[26] On ff. 101b-117b. *GAS*, VII, p. 88.

in 1262[27]. There is little reason to expect either of these works to yield any purely Sasanian material, though, as is the case with most Arabic astrology, some of their contents presumably go back to such a source.

The same is true of three texts preserved in Paris Arabe 2487, which was copied in Egypt in 1492[28]. The first of these is a *Kitāb asrār kalām Hurmus al-muthallath bi-al-ḥikma* (*Book of the Secrets of the Words of Hermes who is Tripled in Wisdom*)[29]. The preface echoes Abū Maʿshar in discussing the first and the second Hermes[30] — it is the second, a Chaldaean, who is alleged to have written the *Kitāb asrār kalām Hurmus* — and then proceeds to give, without proper identification, the *Bundahishn*'s horoscope of Gayōmart, except that Mercury is entered twice (in its exaltation, Virgo 15°, and near the Sun at Aries 29°), and that the Lot of Fortune and the Lot of the Strange join the nine planets. The text breaks off after eight pages in the midst of a general discussion of conjunctions of Saturn and Jupiter, another form of astrology invented in Sasanian Iran.

The next book in this manuscript is a *Kitāb fī aḥkām al-qirānāt* (*Book Concerning the Judgments of the Conjunctions*) said to have been written by Jāmāsb the Wise[31], and to have been transcribed in 1181 from a mysterious manuscript brought to the well-guarded citadel of al-Imām al-Naṣīr, Caliph from 1180 till 1225. The work is a fascinating astrological world history based on the theory of conjunctions of Saturn and Jupiter according to which a conjunction at the beginning of Aries, which occurs at intervals of about 1000 years, indicates prophets; transfers of conjunctions from triplicity to triplicity, which occur about every 240 or 260 years, indicate changes in dynasties; and individual conjunctions, which are separated by twenty years, indicate more short-term historical events[32]. Pseudo-Jāmāsb begins with Zāradusht, whom he places 1300 years after the Flood (that is, in about 2800 B.C.), and continues to about 2300 A.D. In this highly imaginative text the planets, like Indian *devatās*, have many hands, each holding an attribute of the planetary deity.

[27] D. Pingree, *The Astronomical Works of Gregory Chioniades*, vol. 1, 2 parts, Amsterdam 1985, part 1, pp. 8-16.

[28] E. Blochet, 'Études sur le gnosticisme musulman', *RSO*, 2, 1908/1909, pp. 717-56; 3, 1910, pp. 177-203; 4, 1911/1912, pp. 47-79 and pp. 267-300; and 6, 1914/1915, pp. 5-67, esp. 4, 1911/1912, pp. 282-87 (on Jāmāsb), pp. 287-91 (on Zarādusht), and pp. 291-95 (on Hermes).

[29] Ff. 32v-38. *GAS*, VII, p. 55.

[30] Pingree, *The Thousands*, *cit.*, pp. 13-18.

[31] Ff. 39-55v. *GAS*, VII, p. 88.

[32] See, e.g., D. Pingree, 'Historical Horoscopes', *JAOS*, 82, 1962, pp. 487-502.

The final item in the Paris manuscript is a *Kitāb al-qirānāt* (*Book of Conjunctions*) ascribed to Zarādusht the Wise, Master of the *Kitāb al-Majūs*[33]; this *Kitāb al-qirānāt*, it is claimed, was transcribed in 676 A.H. or 1277/1278 A.D., but was completed in Amid on 20 Ramaḍān 544 A.H. or 21 January 1150 during the sixth conjunction of the fiery triplicity, which occurred in 540 A.H. which began in 1457 Alexander or 1145 A.D. Its author was Yahyā ibn Muḥammad al-Ḥalabī. This astrological history discusses the horoscope of the time of the Sun's entry into Aries for every year in which there occurred a conjunction of Saturn and Jupiter between this date, 1145, and 1032 A.H. or 1624 A.D.

Clearly the most that these texts can tell us about their Pahlavī antecedents is that Sasanian astrologers were famous as practitioners of the art of using the celestial science to reconstruct the political and religious history of the world through the theory of conjunctions, and to make general annual predictions on the basis of the horoscopes of the revolutions of the years and the prorogations of the *fardārs*, *intihā's*, and *qismas*. Indeed, chapter 14 of the Mandaean *Book of the Zodiac*[34], which, like much of that curious work, is based on a Sasanian original, contains annual predictions based on the progress of the *intihā'* through the twelve zodiacal signs. Moreover, Ibn Khaldūn[35] associates historical astrology with Buzurjmihr and Khusrō Anūshirwān and with an authority bearing the Iranian name Hurmuzdāfrīd who predicted the duration of the Sasanian dynasty; and the early ʿAbbāsid astrologers of Iranian background whom I mentioned before, who are the first whose books on this type of astrology are preserved, already in the time of al-Mahdī and Hārūn al-Rashīd were using a fully developed theory in which the conjunctions are linked to Iranian millennarianism and to the Indian theory of the Grand Conjunction at Aries 0° at the beginning of the Kaliyuga (in the Arabic texts equated with the Flood), the Grand Conjunction that also was basic to the computation of the mean longitudes of the planets in the Indian astronomical systems that the Sasanians had based their own astronomy on. Moreover, in several of the early treatises on conjunction astrology ancient Iranian figures like Hūshānk, Ṭahmūrath, Jāmshīd, and, of course, Zarādusht play prominent roles.

To Zarādusht is ascribed the oldest surviving genuine Arabic translation of a Pahlavī astrological work that we possess. This is the *Kitāb al-mawālīd*[36], which is the last of the five such books which were, according to the introductory remarks of the *Kitāb al-mawālīd*, translated from Pahlavī into Ara-

[33] Ff. 56-105v. *GAS*, VII, p. 86.

[34] E.S. Drower, *The Book of the Zodiac*, London 1949, pp. 110-9.

[35] F. Rosenthal, *Ibn Khaldūn. The Muqaddimah*, 3 vols., London 1958, vol. 2, pp. 215-16.

[36] An edition is in preparation. See for now *GAS*, VII, pp. 85-6 and Pingree, 'Classical and Byzantine Astrology', *cit.*, pp. 234-35.

bic for Sunbādh, Ispahbadh from 747 till 754, and another Ispahbadh named Māhoya, the son of Māhānāhīdh, by Saʿīd ibn Khurāsānkhurrah. The other four books of Zarādusht described by Saʿīd are a *Kitāb hayʾat al-falak* (*Book of the Configuration of the Sphere[s]*); a *Kitāb ṣuwar daraj al-falak al-thalathmāʾa wa al-sittayn* (*Book of the Images of the 360 Degrees of the Sphere*) of which a summary exists in the *Kitāb al-jāmiʿ al-shāhī* (*Book of the Royal Compiler*) of Aḥmad al-Sijzī[37]; a *Kitāb al-qirānāt wa al-duwal wa al-mulk wa al-mulūk wa al-anbiyāʾ* (*Book of Conjunctions and of Dynasties and of Dominion and of Kings and of Prophets*). The first of these appears to be on astronomy and the second on the astrology of μονομοιρίαι and magic (with it should be compared the lost book on the images of the decans attributed to Tīnkalūsh and also translated into Arabic from Pahlavī)[38], the third remains obscure, while the fourth is on historical astrology, which we have seen to have been an invention of the Sasanian astrologers. The reliability of Saʿīd's descriptions, however, is called into doubt by his full title for the fifth book, the one that we still have: *Kitāb al-mawālīd wa al-kusūfāt wa taḥāwīl sinī al-ʿālam wa tasyīr qismat al-dunyā wa taḥāwīl sinī al-mawālīd wa al-masāʾil* (*Book of Nativities and Eclipses and Revolutions of the Years of the World and Prorogation of the Division* (qisma) *of the World and Revolutions of the Years of Nativities and Interrogations*). Only the phrases *Book of Nativities* and (to a minor extent) *Revolutions of the Years of Nativities* describe the text we have; most of the rest belongs to a book on historical astrology, and perhaps the phrases are displaced in the manuscript from Saʿīd's description of the lost fourth book; the last item in the title, *Interrogations*, ought to have been in a separate book of its own.

Saʿīd confesses that he did not translate the original work of Zarādusht on nativities, but a translation of this into 'Newer Persian' that had been made by Māhānkard in, apparently, 637, the year in which Ctesiphon was captured by the Arabs. This same Māhānkard, *al-mufaṣṣar*, was present in November of 629 when a son was born to Adhīn whose nativity indicated the passing of the reign of Ardashīr III; that monarch was indeed dethroned on 27 April 630. But a revision of the text had been made in the time of Khusrō Anūshirwān, as is indicated by two horoscopes that can be dated 1 August 487 and 6 October 549 respectively. Finally, there is also the horoscope of someone born at Ḥarrān on 9 April 232, who is probably the author of the Greek original that would have been translated into Pahlavī, probably in the later 3rd century. Since Zarādusht is portrayed as having been born in Adharbayjān, but as having studied astrology and magic at Ḥarrān under a master apparently named Aelius the Wise (the name in Arabic is without

[37] Pingree, *The Thousands*, *cit.*, p. 22.
[38] Nallino, *op. cit.*, pp. 356-62.

points, but could be read Iliyūs), the authors of that Greek original may have been this astrologer of Ḥarrān named Aelius. However, Ibn Khaldūn[39] preserves a story connecting Iliyūs (Ulyūs) with Khusrō Abarwīz.

The Greek original of the *Kitāb al-mawālīd* presented an astrological theory similar to that expounded in the astrological poem composed by Dorotheus of Sidon in about 75 A.D.[40] and in the Ἀνθολογίαι written by Vettius Valens about a century later[41]; both of these works, as we shall see soon, were independently translated into Pahlavī. From the Pahlavī version of Dorotheus one of the Sasanian redactors of the *Kitāb al-mawālīd*, probably in the 6th century, has inserted into it a reference to Dorotheus as the King of Egypt; other added material includes a chapter attributed to Hermes on the use of certain fixed stars in genethlialogy[42], the exaltations of the Head and Tail of the Dragon, and a few elements of Indian astrology. And, of course, there are many technical terms transliterated from Pahlavī into Arabic, including the names of sixteen fixed stars; and, for the first astrological treatise in Arabic, a surprising number of technical terms in that language that have no precise Greek counterpart, but which became standard among later Muslim astrologers. These are presumably simply Arabic versions of Pahlavī words that represent some of the developments introduced by Sasanian astrologers into genethlialogy.

But the principle work in Pahlavī on genethlialogy and catarchic astrology of which we have detailed knowledge consists of the five books of Dorotheus of Sidon. While we have quite extensive fragments of an Arabic translation of this that was made by Māshā'allāh in the 770's[43], the most complete Arabic version is that made by 'Umar ibn al-Farrukhān al-Ṭabarī in about 800. 'Umar's version is not a complete translation of the Pahlavī, for fragments of Māshā'allāh's correspond to citations by Hephaestio of Thebes of Dorotheus' views that are omitted by 'Umar; and it represents a contaminated version, contaminated, most noticeably, by two horoscopes introduced into the text by Sasanian redactors; one, that also was a part of Māshā'allāh's text, was cast for 20 October 281, the other for 26 February 381. The other added material includes references to Hermes, Valens, and Qīṭrinūs al-Sadwālī, and a few Indian concepts, as usual. But, as is the case

[39] Rosenthal, *op. cit.*, vol. 2, p. 216.

[40] *Dorothei Sidonii Carmen astrologicum*, ed. D. Pingree, Leipzig 1976.

[41] *Vetti Valentis Antiocheni Anthologiarum libri novem*, ed. D. Pingree, Leipzig 1986.

[42] P. Kunitzsch, 'The Chapter on the Fixed Stars in Zarādusht's *Kitāb al-mawālīd*', *ZGAIW*, 8, 1993, pp. 241-49.

[43] *Leiden Or.* 891, ff. 1b-6a, contains Māshā'allāh's translation of the Pahlavī text corresponding to II 14, 1 - II 16, 18 of 'Umar's. See further Pingree, 'Classical and Byzantine Astrology', *cit.*, and Id., 'Māshā'allāh', *cit.*

with the *Kitāb al-mawālīd*, the substance of Dorotheus' four books on genethlialogy in their Pahlavī version remains overwhelmingly Greek in character.

The same is true of the last book, that on catarchic astrology. But already Māshā'allāh repeats these same catarchic subjects and astrological techniques transformed into interrogations; for example, chapters in Dorotheus on choosing the time to launch a ship or to buy land become in Māshā'allāh chapters answering the question of whether or not someone will do these things. The transformation of Greek catarchic into interrogational astrology took place in India, as interrogations appear already in the *Yavanajātaka* composed in Sanskrit by Sphujidhvaja as was noted in chapter 3; and both Pahlavī stories and the inclusion of interrogations in Sa'īd ibn Khurāsānkhurrah's description of Zarādusht's books on the astral sciences demonstrate that the Sasanian astrologers were familiar with this branch of the science. I suspect, therefore, that Māshā'allāh's transformations of Dorothean καταρχαί into ἐρωτήσεις reflect a process that had already run its course in Sasanian times.

Māshā'allāh cites, in his *Kitāb al-mawālīd al-kabīr*, which is preserved in its Latin translation only, the *Liber de nativitatibus*[44], and in his four books on genethlialogy entitled in their Latin translation, made by Hugo of Sanctalla in the 1140's, the *Liber Aristotilis de ducentis quinquaginta quinque Indorum voluminibus universalium questionum tam genetialium quam circularium summam continens*[45], several other authorities whose works he read in Pahlavī and translated, at least in part, into Arabic. The first of these is Vettius Valens of Antioch, who composed his Ἀνθολογίαι, as we have mentioned, in about 175 A.D. The *Anthologies* were translated into Pahlavī, as we know from the bibliographies of Ibn al-Nadīm and Ibn al-Qifṭī, under the title *Bizīdaj*[46] (from the Pahlavī *Wizīdag*, meaning *Choice*), a name under which Valens' work is several times cited by Māshā'allāh; and we have seen that references to Valens were inserted into the Pahlavī version of Dorotheus. There are numerous citations in later Arabic astrologers from a now lost Arabic translation of the Pahlavī version of Valens; these have not yet been collected and compared with the rather imperfectly preserved Greek text of the Ἀνθολογίαι. That task will be made more difficult by the fact that, as we are directly informed by Ibn al-Nadīm and Ibn al-Qifṭī and as is implied by Māshā'allāh in the *Liber Aristotilis*, the *Wizīdag* was commented on and revised — much as had been Dorotheus and Zarādusht at the same time — by Buzurjmihr, in the 6th century if it is correct that he was a contemporary

[44] An edition of this work together with much else by Māshā'allāh in Arabic and in Greek and Latin translations is being prepared.

[45] An edition of this text by C. Burnett & D. Pingree will be published shortly.

[46] Nallino, *op. cit.*, pp. 351-56.

of Anūshirwān. Buzurjmihr's revision of Valens, according to Ibn Hibintā[47], a Christian astrologer of Baghdād writing in about 950, was also entitled *Bizīdaj*, but included the sayings of the wise men, not just of Valens; and Ṣā'id al-Andalusī[48], writing in 1068, describes Valens' *Bizīdaj* as being concerned with nativities and their revolutions, and as having an introduction to these topics. This general outline perfectly fits Māshā'allāh's *Liber Aristotilis*, though that text was expanded by the inclusion of material that could not have been in Buzurjmihr's original, mainly drawn from the Θησαυροί of the early 7th century Greek astrologer, Rhetorius of Egypt. It is not surprising, then, that the *Liber Aristotilis* cites Zarmiharus — that is, Buzurjmihr as transliterated into Latin by Hugo — as (Māshā'allāh's) source for his genethlialogy and as one who commends the subject of the revolutions of the years of nativities, which is treated in detail in the last book of the *Liber Aristotilis*. It would appear that Māshā'allāh's work, which save for some fragments of the Arabic original preserved by Sahl ibn Bishr, survives only in its 12th century Latin translation, was to a substantial extent based on Buzurjmihr's 6th century revision of the Pahlavī version of Valens' *Anthologies*. There are, as is the case with Valens, numerous citations from Buzurjmihr in the Arabic astrological literature which need to be collected and compared with Hugo's Latin.

Since the last parts of Buzurjmihr's and of Māshā'allāh's works were both descriptions of the continuous horoscopy made popular in Sasanian Iran by Dorotheus and Valens, there is reason to believe that the later of the two texts (Māshā'allāh's) is dependent in part here on the older (Buzurjmihr's) as had been the case in the purely genethlialogical part. But this section of Māshā'allāh's work has been shown by Charles Burnett[49] to have been largely derived from the *Kitāb al-mawālīd* of an obscure fellow bearing a clearly Pahlavī name, Zādānfarrūkh al-Andarzaghar (in Pahlavī, *handarzgār* means 'the advisor'). We do not know when al-Andarzaghar lived, whether before or after Buzurjmihr, though, if our hypothesis that Māshā'allāh's *Liber Aristotilis* is based on Buzurjmihr's *Wizīdag* is correct, then it should be concluded that the latter incorporated Handarzgār's text into his own, presumably because the subject is only incompletely addressed by Valens in the *Anthologies*[50].

[47] *The Complete Book on Astrology by Ibn Hibintā*, ed. F. Sezgin, 2 vols., Frankfurt am Main 1987, vol. 1, p. 262 = vol. 2, p. 30.

[48] *Ṭabaqāt al-umam*, ed. Ḥ. Bo, Beirut 1985, p. 69.

[49] C. Burnett & A. al-Hamdi, 'Zādānfarrūkh al-Andarzaghar on Anniversary Horoscopes', *ZGA-IW*, 7, 1991-1992, pp. 294-398.

[50] Andarzaghar's admiration for Valens' *Bizīdaj* is recorded by Ṣā'id in *Ṭabaqāt al-umam*, *cit.*, p. 110.

There survives in Arabic yet another treatise attributed to Valens, the *Kitāb al-asrār* or *Book of Secrets*[51]. This deals with a combination of catarchic and interrogational astrology which in many places reminds one of Dorotheus' book on καταρχαί, and in its interrogations and in its coverage of questions concerning political authority reflects Sasanian interests. However, I am not yet certain about either the date of this little treatise or the possibility of its being a translation from Pahlavī.

The vast Arabic compendia such as ʿUmar ibn al-Farrukhān's *Kitāb al-masāʾil*, Sahl ibn Bishr's *Kitāb al-mawālīd*, Abū Maʿshar's many works, Abū al-ʿAnbas al-Ṣaymarī's[52] *Kitāb al-uṣūl*, and al-Qaṣrānī's *Kitāb al-masāʾil* have yet to be fully exploited for their many testimonia to Sasanian astrology. But already it is absolutely clear that the Greek bases for genethlialogy in pre-Islamic Iran were the works of Dorotheus, Valens, and Hermes, and the Greek text that became the *Kitāb al-mawālīd* of Zarādusht, while the catarchic astrology came primarily from Dorotheus, and secondarily from Valens; from the Sanskrit tradition came also some catarchic astrology, especially the military astrology of the *Bṛhadyātrā* of Varāhamihira, which appears in the works written in Greek at Baghdād in the 770's by Theophilus of Edessa[53], but also the transformation of catarchic into interrogational astrology. Historical and political astrology combined the Indian theory of the *yugas* of the planets in which integer numbers of conjunctions occur, the Zoroastrian theory of millennia, and the Greek method of interpreting the revolutions of years, substituting years of the world for years of nativities, their division of lives into periods of years, in Pahlavī *fardār*, and their employment of the ἀφέτης or prorogator, in Pahlavī apparently called the *hilāg*[54], which became in historical horoscopy the Arabic *qisma*. This historical horoscopy, with its political variant, was the most influential innovation attributable to Pahlavī astrologers, though they contributed much else, especially interrogations to Arabic astrology and its neighbors and dependents in Western Europe and in Byzantium.

If we now look at the Iranians' own historical tradition we find that the reconstruction that we have offered — initial translations from Greek and Sanskrit in the early Sasanian period with massive revisions of the texts under Khusrō Anūshirwān in the 6th century — is confirmed. That tradition

[51] Istanbul, Nuruosmaniye 2920, ff. 31b-59a; on f. 42 Dorotheus is cited. *GAS*, VII, pp. 40-41.

[52] *GAS*, VII, pp. 152-53.

[53] Pingree, 'Classical and Byzantine Astrology', *cit.*, p. 236.

[54] A. Panaino, 'Considerazioni sul lessico astronomico-astrologico medio-persiano', *Lingue e culture in contatto nel mondo antico e altomedievale*, Brescia 1993, pp. 417-33, esp. p. 426.

is preserved, *inter alia*, in a passage in the fourth book of the *Denkart* that appears to go back to the time of Anūshirwān[55], and in a section of the *Kitāb al-Nahmaṭān* written by one of Hārūn al-Rashīd's astrologers, the originally Zoroastrian Abū Sahl ibn Nawbakht, and preserved in Ibn al-Nadīm's *Kitāb al-fihrist*[56]. These two agree that a massive program of translation into Pahlavī of books gathered from India and the Roman Empire was initiated by the first two Sasanian kings, Ardashīr I and Shāpūr I, and that these translations were revised under Anūshirwān. Ibn Nawbakht names some of the books so translated; they are the works of Hermes, Dorotheus, Qīdrūs, Ptolemy, and Farmāsb the Indian. Qīdrūs may be the Qīṭrinūs al-Sadwālī whose chapter on iatromathematics is incorporated into 'Umar's translation of Dorotheus; Ptolemy probably refers to the Pahlavī versions of his *Syntaxis mathēmaticē* and *Handy Tables*; and Farmāsb may be a corruption of a Sanskrit name such as Parameśvara. All we are missing in Ibn Nawbakht's list is a reference to Vettius Valens.

[55] R.C. Zaehner, *Zurvan: A Zoroastrian Dilemma*, Oxford 1955, pp. 7-9, quoted in Pingree, *The Thousands*, *cit.*, pp. 7-9.

[56] *Kitāb al-fihrist li'l-Nadīm*, edited by M. al-Ḥā'irī al-Māzandarānī, 3rd ed., Beyrut 1988, pp. 299-300; there is an abbreviated translation in Pingree, *op. cit.*, pp. 9-10.

CHAPTER 5
KANAKA: AN INDIAN (?) ASTROLOGER AT HĀRŪN AL-RASHĪD'S COURT

Kanaka the Indian[1] (Kankah al-Hindī in Arabic) bears a name that became a favorite symbol used by intellectuals of the Islamic tradition to indicate the partial dependence of some of their sciences upon Sanskrit sources. Thus, in Spain, where the story narrated shortly before 920 by Ibn al-Adamī in his *Naẓm al-ʿiqd* concerning an Indian embassy from Sind bearing the Sanskrit forerunner of *al-Zīj al-Sindhind* to al-Manṣūr's court at Baghdād in 773 was well known[2], Abraham ibn Ezra in the second quarter of the 12th century identified the unnamed Indian astronomer who explained that Sanskrit *Mahāsiddhānta* to al-Fazārī and Yaʿqūb ibn Ṭāriq with Kankah al-Hindī[3]. Similarly, a confusion between Kankah and another Indian scientist named Mankah al-Hindī, who is alleged to have translated a medical treatise by Shānāq (that must represent Cāṇakya though one expects Caraka) from Sanskrit into Arabic during the reign of Hārūn al-Rashīd, led Ibn abī

[1] D. Pingree, *DSB*, vol. 7, New York 1973, pp. 222-24; and *GAS*, VII, pp. 95-96.

[2] Ṣāʿid al-Andalusī, *Ṭabaqāt al-umam*, edited by Ḥ. Bo, Beirut 1985, pp. 130-32; this passage is also quoted by Ibn al-Qifṭī, *Taʾrīkh al-ḥukamāʾ*, edited by J. Lippert, Leipzig 1903, pp. 270-71. There is a translation of both together in F.I. Haddad, E.S. Kennedy, & D. Pingree, *The Book of the Reasons behind Astronomical Tables*, Delmar 1981, pp. 222-23.

[3] D. Pingree, 'The Fragments of the Works of Yaʿqūb ibn Ṭāriq', *JNES*, 27, 1968, pp. 97-125, esp. pp. 101-2 (frag. Z 2) and pp. 97-98; also Abraham ibn Ezra, *El libro de los fundamentos de las Tablas astronómicas*, edited by J.M. Millás Vallicrosa, Madrid-Barcelona 1947, p. 92.

Uṣaybiʿa to attribute medical treatises to the former[4]. Further, the unknown compiler of the *Ghāyat al-ḥakīm*, who was working in Spain in the middle of the 11th century, describes an amulet allegedly invented by an Indian king, whom he identifies with Kankah al-Hindī[5]; this king, he continues, built the city of Memphis in Egypt and performed many miraculous feats, such as discovering amicable numbers, constructing magical healing images, and making an eternally full drinking-bowl in the time of Alexander the Great; the hero of these legends in the *Ghāya* suddenly is transformed into one ʿAzīm al-Hindī, and Kankah is relieved of responsibility for a miraculous statue of the Buddha and other strange devices. The legend that Kankah was a ruler, however, continues in a Latin translation, the *Liber universus*, of an Arabic text which was written by ʿUmar ibn al-Farrukhān al-Ṭabarī in about 800[6]; we shall return to this text later. The Latin translator was Abraham ibn Ezra's contemporary, John of Seville, who calls the subject of this paper Kankaraf Indus, presumably representing a corruption of the Arabic Kankah rabb al-Hind. Moreover, included in a collection of Spanish texts on astrology and astral magic put together, in part from the *Ghāya*, at the court of Alfonso el Sabio in the early 1250's is a brief treatise on magic involving the lunar mansions that is said to have been composed by Kancaf el Yndio for his pupil, Sirez de Babilonia[7]. And finally, more than three centuries earlier, Jābir in his *Kitāb al-mujarradāt* (*Book of Purities*) includes Kankah in a list of ancient philosophers[8]; the others whom he names are Hermes the Greatest, Pythagoras, Democritus, Kaṭrāmisha, Īlūlī, Socrates, and Aristotle.

While it is easy to discard all of these fantasies, and also the mistakes that some modern historians of Islamic philosophy and science have made as a result of some of them (especially Abraham in Ezra's association of Kankah with *al-Zīj al-Sindhind*), that rejection does not solve the problem of who Kankah actually was. We can be fairly certain that Ibn abī Uṣaybiʿa was exaggerating when he wrote that[9]: 'Kankah was skillful among the ancient

[4] Ibn abī Uṣaybiʿa, *ʿUyūn al-anbāʾ fī ṭabaqāt al-aṭibbāʾ*, 3 vols., Beirut 1956-1957, vol. 3, p. 49; cf. pp. 51-2 for Mankah.

[5] *Pseudo-Maǧrīṭī. Das Ziel des Weisen*, edited by H. Ritter, Leipzig 1933, pp. 278-79 for Kankah; see pp. 279-80 for Azīm.

[6] D. Pingree, 'The Liber Universus of Umar Ibn al-Farrukhān al-Ṭabarī, *JHAS*, 1, 1977, pp. 8-12, esp. p. 11.

[7] Edited by A.M. Vaccaro, 'Kancaf el Yndio sulle ventotto mansioni lunari', *Annali della Facoltà di Magistero dell'Università di Palermo*, Palermo 1959 (not seen). Concerning the Alfonsine manuscript see D. Pingree, 'Between the *Ghāya* and *Picatrix* I: The Spanish Version', *JWCI*, 44, 1981, pp. 27-56.

[8] P. Kraus, *Jābir Ibn Ḥayyān*, voll. 2, Le Caire 1942, p. 59 note 1.

[9] *ʿUyūn al-anbāʾ*, *cit.*, vol. 3, p. 49.

scientists of India and was the greatest of them. He investigated the art of medicine, the power of drugs, the nature of begotten creatures, and the properties of things found (in nature). He was the most learned of men in cosmology, in the order of the spheres, and in the motion of the stars'. In support of this hyperbole Ibn abī Uṣaybi'a quotes a well-known ninth century astrologer: 'Abū Ma'shar Ja'far ibn Muḥammad ibn 'Umar al-Balkhī says in his *Kitāb al-ulūf* (*Book of the Thousands*) that Kankah was the foremost in the science of the stars among all the scientists of India in the past'. The same praise of Kankah is found in Ṣā'id al-Andalusī's *Ṭabaqāt al-umam*[10]. But Abū Ma'shar would have made this statement in the context of the fantastic history of science that he elaborated in the *Kitāb al-ulūf*, which we must now recapitulate as it will explain many of the Kankah stories we have already related[11].

Abū Ma'shar conceives of three founders of science named Hermes, understanding the epithet Τρισμέγιστος as τρεῖς μέγιστοι. The first was Hūshānk, the grandson of Gayōmart and identical with Khanūkh (Enoch), who is Idrīs. Hūshānk studied astronomy and medicine, and built the pyramids and cities in Upper Egypt, and inscribed in hieroglyphs the sciences he knew on the walls of a temple at Akhmīm (Panopolis) in order to preserve them from the coming Flood that he predicted from the horoscope of the revolution of the solar year in which occurred a conjunction of Saturn and Jupiter in Scorpio, indicating the Flood because with it the conjunctions shifted from the triplicity of the air to the triplicity of water; the date of the revolution of this year was 11 February 3381 B.C. There are four triplicities, each formed of three zodiacal signs separated from each other by three intervening signs: Aries, Leo, and Sagittarius constitute the triplicity of fire; Taurus, Virgo, and Capricorn that of earth; Gemini, Libra, and Aquarius that of air; and Cancer, Scorpio, and Pisces that of water.

Hūshānk, the first Hermes, was succeeded by Ṭahmūrath in 3331 B.C.; in the first year of his reign, the Ṣābian Budhāsaf (i.e., the Bodhisattva) fled from Babylon to India and established there the Indian permutation of the first Hermes' astronomical theory which was based on a *yuga* of 360,000 years, whereas the Indians chose to use a *Mahāyuga* of 4,320,000 years (= 12 of Hermes' *yugas*) or a *Kalpa* of 4,320,000,000; Ṭahmūrath later stored a manuscript containing an account of this first Hermes' astronomy in the Sārawīya, a building that he constructed at Jay in Iṣfahān. When this building was excavated in early 'Abbāsid times, the manuscript was allegedly discovered, and its astronomy became the science taught by Abū Ma'shar in the *Kitāb al-ulūf*.

[10] *Ṭabaqāt al-umam*, *cit.*, pp. 62-3.

[11] Abū Ma'shar's history of science is reconstructed in D. Pingree, *The Thousands of Abū Ma'shar*, London 1968, pp. 13-19.

After the Flood occurred in 3102 B.C., however, during the reign of Jāmshīd, as Abū Maʿshar's story continues, there was a second Hermes who lived in Babylon and restored the sciences of medicine, philosophy, and numerology; he was the teacher of Pythagoras, from whom the Greek mathematical sciences and some of their philosophy descends. The third Hermes was an Egyptian, the Hermes of the *Corpus Hermeticum* and the alchemical tradition and the teacher of Asclepius; it is he who became the prophet of the Ṣābians of Ḥarrān.

It was, of course, according to Abū Maʿshar, Budhāsaf's Indian version of the first Hermes' *yuga*-system of astronomy (and astrology) that Kanaka was allegedly heir to, and which was represented in the early ʿAbbāsid period by, primarily, *al-Zīj al-Sindhind* (from the *Brāhmasphuṭasiddhānta* of Brahmagupta), as well as by the *Zīj al-Arkand* (from the *Khaṇḍakhādyaka*, also of Brahmagupta), and the *Zīj al-Arjabhar* (from the *Āryabhaṭīya* of Āryabhaṭa)[12].

Most of the legends concerning Kankah, then, can be explained as confusions between Kankah and the several manifestations of Hermes in this convoluted story by Abū Maʿshar and, of course, confusion between the role given to him by Abū Maʿshar in the remote origination of *al-Zīj al-Sindhind* and the more sober story preserved by Ibn al-Adamī concerning the Indian delegation from Sind to the court of al-Manṣūr.

Having disposed of the fabulous accounts, we can turn to the more reliable facts that we know about Kanaka. The name is neither Arabic nor Persian, but does occur in India; *kanaka* means 'gold' in Sanskrit, and was also the name of a group of people who lived in Western India, in Gujarāt, southern Rājasthān, and Sind, in association with the Śakas (or Scythians) and other Mleccha groups. They were located in that region by Varāhamihira in the middle of the 6th century[13]; and indeed a place named Kāṇaka, a village in Sindhuviṣaya (the province of Sind), is mentioned in a Traikūṭaka inscription dated in either 493/4 or 494/5[14]. Writing his *Sārāvalī* in Vyāghrataṭī in Bengal in about 800, Kalyāṇavarman[15] refers to a Kanakācārya — the teacher of the Kanakas — as an authority on *viyonijanma* or the horoscopes

[12] For these three works see al-Hāshimī, *The Book of the Reasons*, *cit.*, pp. 216-25; pp. 207-11; and pp. 206-7.

[13] Varāhamihira, *Bṛhatsaṃhitā* XIV 21, ed. S. Dvivedin, 2 vols., Benares 1895-1897; this was translated into Arabic by al-Bīrūnī, *Fī taḥqīq mā li 'l-Hind*, Hyerdabad 1958, p. 195.

[14] V.V. Mirashi, *Inscriptions of the Kalachuri-Chedi Era*, *CII* IV, 2 vols. Ootacamund 1955, vol. 1, pp. 29-32 (see line 2 of the text on p. 31).

[15] Kalyāṇavarman (*CESS*, A 2, pp. 26a-29a; A 3, p. 19a; A 4, pp. 47a-47b; and A 5, pp. 29b-30a), *Sārāvalī* LIII 1, ed. V. Subrahmanya Śāstrin, Mumbayī 1928. For this Kanaka see *CESS*, A 2, pp. 19a-19b.

of the nativities of animals and plants; since our Kanaka was, as we shall see, in Baghdād at the same time as Kalyāṇavarman was writing in Bengal, it is unlikely that the latter was referring to the former; but there were perhaps two Kanaka astrologers from Western India, of whom one wrote on astrology in Sanskrit while the other sought his fortune in the ʿAbbāsid court. The Śakadvīpikas, of whom the Kanakas seem to have been a sub-group, are still noted in India as astrologers today.

The great Arabic bibliographer, Ibn al-Nadīm, knew of several works by the latter Kankah[16]: a *Kitāb asrār al-mawālīd* (*Book of the Secret of Nativities*), of which a fragment of seven pages seems to be preserved in a manuscript at Corum in Turkey (it is entitled *Min kalām Kankah al-Hindī al-mawālīd*); and three other books based on astrological techniques that were developed in Iran under the Sasanians: a *Kitāb al-namūdār fī al-aʿmār* (*Book of the Namūdār Concerning (the Lengths of) Lives*), where *namūdār* is a Persian word meaning 'proof' and corresponds to the Greek γνώμων ὡροσκοπικός described by Vettius Valens, whose Ἀνθολογίαι were translated into Pahlavī in the 3rd century as we saw in Chapter 4; and a large and a small *Kitāb al-qirānāt* (*Book of Conjunctions*, referring to the theories of historical horoscopy invented in Sasanian Iran and characterized by the periodic conjunctions of Saturn and Jupiter to which we have already referred). Aside from possibly the *Book of the Secrets of Nativities*, which I have not seen, everything that we can discover concerning the doctrines propounded by Kanaka the Indian links him intellectually to Sasanian Iran, and not to India; he was, indeed, only one of many practitioners of Sasanian astrology in Arabic in early ʿAbbāsid times. Unfortunately, we do not know whether he learned this astrology while he was in India from, perhaps the Maga Brāhmaṇas or the Śakadvīpikas, or whether he picked it up in ʿIrāq from his colleagues at the ʿAbbāsid court; the latter seems the more likely since, as we shall see, he utilized a series of horoscopes of moments significant for the history of Islām that had been cast by someone at the court of Hārūn al-Rashīd, who followed the chronology of Māshāʾallāh, but used a different *zīj* than did that astrologer; of course, the caster of those horoscopes could conceivably be Kanaka himself.

Indeed, al-Bīrūnī in his *Al-āthār al-bāqiya*[17] states that Kankah the Indian, an astrologer of Hārūn, predicted that the ʿAbbāsids would be overthrown by a man from Iṣfahān. Kanaka, as we shall see, could legitimately predict this from the fact that the conjunction of Saturn and Jupiter in 928,

[16] *Kitāb al-fihrist li ʾl-Nadīm*, edited by M. al-Ḥāʾirī al-Māzandarānī, 3rd ed., Beirut 1988, p. 330.

[17] *Chronologie orientalischer Völker von Albērūni*, edited by C.E. Sachau, Leipzig 1878, p. 132.

that is, some 360 years after the conjunction indicating Islām in 571 and some 180 years after the conjunction indicating the ʿAbbāsids in 749, occurred in Sagittarius, which points to Iṣfahān[18]. Māshāʾallāh, clearly writing before the accession of al-Maʾmūn in 813, had predicted from the Saturn – Jupiter conjunction of 809, which also occurred in Sagittarius and which marked a shift from the watery to the fiery triplicity, that the Arabs would be overthrown by their subjects in the East, particularly those of Iṣfahān, and that the rulership would be transferred from the Bānū ʿAbbās to another family in the 6th (later 4th) year of the conjunction, that is, in 815 (corrected by Ibn Hibintā to 813)[19]. I assume that, if Kankah also made such a prediction under Hārūn al-Rashīd, he may well have agreed with Māshāʾallāh that what was most important astrologically was the shift from one triplicity to another in 809, so that that conjunction would have indicated the end of the ʿAbbāsid dynasty; but, in his surviving *Kitāb al-qirānāt al-kabīr*, which was produced in its final form during the reign of al-Maʾmūn, Kankah predicted the dynasty succeeding the ʿAbbāsids from the horoscope of the revolution of 928, but without mentioning Iṣfahān at all.

The almost unique manuscript of this work of Kankah (a fragment is preserved in the Esat collection in Istanbul) is the third part of Ṣaib 199 in Ankara, of which the first part is Shādhān's *Mudhākarāt Abī Maʿshar* and the second al-Baṭṭānī's *Kitāb fī dalāʾil al-qirānāt wa al-kusūfāt*[20]. In this manuscript the title of Kankah's work is: *Kitāb Kankah al-Hindī fī al-aḥkām ʿalā al-adwār wa al-fardārāt wa al-qirānāt fī al-intiqāl al-milal wa al-duwal* (*The Book of Kanaka the Indian on Judgments According to the Cycles and the* Fardārs *and the Conjunctions Concerning Changes of Religions and Dynasties*). This manuscript is complete from the beginning of Kankah's treatise on f. 43 till its end on f. 76 except that one leaf containing three horoscopes (those of the revolutions of the years 705, 714, and 717) has been lost after f. 72; but, because of the peculiar way in which he designed his book, most of what Kankah had to say about these horoscopes can be recovered from elsewhere in his work. But before analyzing that text, we should note that at the beginning this work is called *al-kabīr*, which justifies our identifying it with the *Great Book of Conjunctions* mentioned by Ibn al-Nadīm, and that at the beginning it is also stated that Kankah wrote it for his son, who is named Raʾyās, or Raybās, or Ranbās, a strange and unexplained name under which he is several times addressed by the author, but

[18] E.S. Kennedy & D. Pingree, *The Astrological History of Māshāʾallāh*, Cambridge, Mass. 1971, pp. 66-68 (f. 224 v. 3 - f. 225 v. 19), and pp. 122-25. For Kankah's discussion of this horoscope see note 42.

[19] *Ibid.*, pp. 55-59 (f. 217v. 10 - f. 219. 19) and pp. 112-15.

[20] The *Mudhākarāt* on ff. 1a - 26b, the *Kitāb fī dalāʾil al-qirānāt* on ff. 27a - 42b, and Kankah's work on ff. 43a-76a.

never, in this manuscript, with the diacritical marks essential for its correct reading.

Kankah has divided his book into two parts, the first of which describes the theory of historical astrology in an extremely confused manner, mixing in a number of examples both historical and fictitious with a disorganized jumble of techniques[21], while the second describes, in three separate reviews of virtually the same sequence of horoscopes, the astrological reasons for the dates of the deaths of the early Caliphs[22]: the first time he stops his review in 786, the year of the death of Mūsā al-Mahdī and of the accession of Hārūn al-Rashīd, whom Kankah knows correctly to be fated to die in 809; the second time he ends with 809, the year of the death of al-Rashīd and of the accession of al-Amīn, whom he correctly knows to be fated to die in 813, and the last time he ends with 813, the year of the death of al-Amīn and the accession of al-Ma'mūn, whom he incorrectly predicts to be destined to rule the theoretical maximum time possible in the then current quarter of the 360-year cycle, that is twenty-three years. This allows us to date the final version of the *Great Book of Conjunctions* to the reign of al-Ma'mūn, but leaves us in doubt as to whether this was a third recension, following two made during the reigns of al-Ma'mūn's two immediate predecessors to which Kankah simply tacked on additions without revising what he had already written, or whether some other now incomprehensible line of reasoning or historical circumstances led to the present shape of this second portion of the book. Before briefly turning from it to the consideration of the first part, I should inform you that in each of the three or more discussions of the horoscopes of the revolutions of the years of the accessions of each Caliph, one or several new astrological computations of the date of his death are exhibited, and that no computation is ever repeated. This care to avoid repetition of the computations while reconsidering the same horoscopes guarantees the unity of the authorship of a work that otherwise one might regard as a conflation of similar material from different sources.

At the beginning of the first section Kankah promises to tell his son about celestial omens such as lunar eclipses, fires seen in the sky, and meteors; and, indeed, later in this section[23] he announces that these are to be explained by the astrological theories of the cycles and the conjunctions, and so are as much under the control of the planets as are terrestrial phenomena. This seems to contradict the long citation from Kankah that is preserved by Ibn Hibintā in his *al-Kitāb al-mughnī fī aḥkām al-nujūm*[24], in which Kankah

[21] Ff. 43a-57a.

[22] Ff. 57a-76a.

[23] Ff. 43a and 47a.

[24] *Al-Mughnī fī aḥkām al-nujūm*, edited by F. Sezgin, 2 vols., Frankfurt am Main 1987, vol. 1, pp. 360-62 = vol. 2, pp. 138-40.

describes the predictions to be made as comets appear in the east or in the west while the Sun is in each of the twelve signs of the zodiac, though such theoretical contradictions occur among all who attempt simultaneously to predict from omens and from astrology.

The basic astrological theory utilized by Kankah, as I have previously indicated, is that developed in Sasanian Iran for reconstructing past political and religious history and for predicting that of the future. The form of this historical astrology employed in the *Great Book of Conjunctions* depends on cycles of 360 years (called by Abū Maʿshar *Mighty Fardārs*)[25], each ruled by a planet and a zodiacal sign; Kankah's chronology, both in the *Great Book of Conjunctions* and in the *Liber universus*, agrees with Māshāʾallāh's in beginning with the *fardār* of Saturn and Cancer, which commenced in 3381 B.C. Within this system of *fardārs* rotate through the ecliptic a *qisma* at the rate of 1° in every solar year, and an *intihāʾ* which moves one zodiacal sign every year. The *fardārs* are divided into four unequal quarters based on the four seasons of a solar year; they are arranged so as to imply that the solar apogee is at 20° of Gemini, its position according to Āryabhaṭa's *ārdharātrika* system. Beside this system of cycles runs the series of conjunctions of Saturn and Jupiter within the triplicities, and their transfers from one triplicity to another, to provide a millennial structure punctuated by four transfers, within each of which are twelve or thirteen 20-year periods between consecutive conjunctions. Abū Maʿshar, in the *Mudhākarāt* of his pupil Shādhān, refers to Kankah al-Hindī as an expert in this type of astrology[26]. But Kankah, in applying this theory to the determination of the lengths of the reigns of the Caliphs, mixes with it various elements of Greek astrology to assist in arriving at the answers in a variety of ways. Some of these, like the planets' exaltations and their terms according to Dorotheus, had long been a part of Sasanian astrology, though, beside technical terms like *fardār*, I have noted only one Pahlavī phrase — *al-jawī rāst*, which is Pahlavī *gōy rāst*, the "straight ball", a translation of the Greek σφαῖρα ὀρθή or right ascension; other Hellenistic ideas, like the great, middling, and small years of the planets, came directly from the Greek-writing Syrian Theophilus of Edessa through Māshāʾallāh to Kankah; he uses nothing of Indian origin except for Āryabhaṭa's longitude of the solar apogee, which was also used in the *Zīj al-Shāh* that had been translated from Pahlavī into Arabic by al-Tamīmī. In his science, then, Kankah is not distinguishable from his contemporaries of Iranian education such as were Nawbakht and ʿUmar ibn al-Farrukhān at-Ṭabarī.

[25] Pingree, *op. cit.*, pp. 60-70.
[26] Section 8 in my unpublished, tentative edition.

In fact, there is abundant evidence that many of these early Islamic astrologers copied their Sasanian predecessors in writing astrological histories. For now I shall just mention Stephanus the Philosopher, who studied Sasanian astrology under the Syrian Theophilus of Edessa at Baghdād and then went to Constantinople where he wrote in Greek in about 775 an astrological history of the Caliphs, the Ἀποτελεσματικὴ πραγματεία which is based on the horoscope of 1 September 621, the beginning of the Byzantine year in which the Hijra occurred, the fictitious date of his being asked about the future of Muḥammad's new religion[27]; Māshā'allāh ibn Atharī, Theophilus' colleague, and a Persian Jew, who wrote a *Kitāb fī qiyām al-khulafā' wa ma'rifat qiyām kull malik* (*Book on the Accessions of the Caliphs and Knowledge of the Accession of Each King*) after the death of Hārūn al-Rashīd in 809[28], and a *Kitāb fī al-qirānāt wa al-adyān wa al-milal* (*Book Concerning the Conjunctions and Religions and Faiths*) at about the same time[29]; and Kankah's contemporary, Muḥammad ibn Mūsā al-Khwārizmī, who not only revised *al-Zīj al-Sindhind*, but also computed horoscopes illustrative of the history of Islām; some of these horoscopes cast by al-Khwārizmī are quoted by al-Ya'qūbī in his *History*[30].

Kankah's interest in the Sasanian dynasty, which is presumably to be regarded as reflecting his training in this type of astrology, is manifest at various points in the first section of the *Great Book of Conjunctions*. At one place he gives the horoscope of the revolution of the year in which will occur a conjunction of Saturn and Jupiter in Virgo[31]; this horoscope can be dated 22 March 213, which is also, perhaps by chance, very close to if not identical with the year in which Ardashēr, the son of Pābhagh, began to gain control of some of the cities of Fārs[32]. Actually, the *Mighty Fardār* of the Sun and Taurus that controlled the dynasty of the Sasanians did not begin until 220[33], when the *qisma* was at Aries 0°; and Kankah's statement that the *qisma* was at Pisces 18° at the time of the previous conjunction indicates that he mistook the year of that conjunction to be the equivalent of 208 instead of the 213 that the planetary positions indicate. Since he states further that the first king of the dynasty was crowned twelve years after the

[27] D. Pingree, 'Classical and Byzantine Astrology in Sassanian Persia', *DOP*, 43, 1989, pp. 227-39, esp. pp. 238-39.

[28] Translated in Kennedy & Pingree, *op. cit.*, pp. 129-43.

[29] *Ibid.*, pp. 1-125.

[30] *Ta'rīkh al-Ya'qūbī*, 2 vols., Beirut 1960, vol. 2, pp. 7-8 (birth of the Prophet) and 245 (murder of al-Husayn ibn 'Alī). Al-Ya'qūbī also quotes horoscopes for the day of accession of most of the Caliphs, but does not name their author.

[31] Ff. 50a-50v.

[32] A. Christensen, *L'Iran sous les Sassanides*, Copenhague-Paris 1936, p. 81.

[33] Pingree, *The Thousands*, *cit.*, p. 69.

conjunction when the *qisma* conjoined with the Sun at 0° of Aries, Kankah dated the coronation of Ardashēr in 220 itself, whereas the series of horoscopes of the revolutions of the years in which the Sasanian kings were crowned that is preserved by Aḥmad ibn Muḥammad al-Sijzī, who copied them in the latter half of the tenth century into his *Kitāb al-qirānāt wa taḥāwīl sinī al-ʿālam* (*Book of Conjunctions and Revolutions of Years of the World*), dates that event in 222[34], while modern historians prefer 224[35]. Kankah does agree with al-Sijzī's source in assigning twenty-one kings to the Sasanian dynasty[36]. However, al-Sijzī's source notes a period of four years between the death of Kisrā (that is, Khusrō II Abharvēz) in 628 and the accession of Yazdijird III, which it dates in 633 rather than 632. Kankah mentions, to fill the gap of four years in al-Sijzī's source, that toward the end of the Sasanian dynasty a woman ruled[37]; this is a reference to Khusrō's daughter, Bōrān, who was crowned at Ctesiphon in 630 or 631[38]. Kankah also mentions that Shīrūya (that is, Kavād II Shērōē), the son of Khusrō, was murdered when the *qisma* reached the body of Venus in Taurus in the third conjunction[39]; this refers to the year 630[40], when the *qisma* was in Taurus 20°, a longitude reached by Venus on 7 May in that year. Finally, Kankah informs us that Yazdijird III was killed in the 83rd year of the *Fardār* of Venus and Gemini, which was 652[41]. This first section of the *Great Book of Conjunctions* ends with the horoscope of the revolution of the year of the conjunction of Saturn and Jupiter in Sagittarius in 928, which indicated the fall of the ʿAbbāsids[42].

The second section of the book discusses the various modes of predicting the lengths of the reigns of the Caliphs from the horoscopes of the revolutions of the years in which their accessions or in which conjunctions of Saturn and Jupiter occurred. Kankah discusses or refers to 34 horoscopes; all but the last two — those for 809 and 813 — are identical with horoscopes for the history of the early Caliphate preserved by al-Sijzī, which he clearly copied from a different source than that from which came his Sasanian list[43]. Al-Sijzī's series of 35 horoscopes was compiled during the Caliphate of Hārūn al-Rashīd's successor, al-Amīn, since the compiler knew the length

[34] *Ibid.*, p. 85.
[35] Christensen, *op. cit.*, p. 83.
[36] Kankah on f. 50v, al-Sijzī in Pingree, *op. cit.*, p. 83.
[37] F. 50v.
[38] Christensen, *op. cit.*, p. 492.
[39] F. 56.
[40] Christensen, *op. cit.*, p. 489.
[41] F. 50v.
[42] Ff. 56-56v.
[43] Pingree, *op. cit.*, pp. 93-114.

of Hārūn's reign. Of the 35 horoscopes Kankah omits three[44]: those for the conjunctions of 590 and 630 (to the latter of which, however, he refers in the first section when speaking of the murder of Shērōē), and that of 684, the year in which Marwān ibn al-Ḥakam became Caliph. The horoscopes given in al-Sijzī's source and by Kankah agree, when the latter gives the degrees and minutes of a planet's longitude within a sign, either perfectly or with a variant that is easily explained as a common misreading of *abjād* numbers. Moreover, the comparable horoscopes given by Māshā'allāh, Sahl ibn Bishr,

[44] I list here the horoscopes discussed in Kankah's three series and by al-Sijzī's source.

Year	Kankah 1	Kankah 2	Kankah 3	al-Sijzī
571	f. 59v (see f. 50)			1
590				2
610	f. 59v. (see f. 56)			3
622	f. 60			4
630	(see f. 56)			5
632	f. 60		f. 71	6
634	f. 60v. (see f. 57)		f. 71v.	7
644	f. 61 (see f. 58)	f. 66v.	f. 71v.	8
650	f. 61v.			9
656	f. 61v. (see f. 57v.)	f. 66v.	f. 72	10
660	f. 61v.		f. 72	11
661	f. 61v.	f. 67		12
669	f. 62			13
680	f. 62	f. 67	f. 72v.	14
683	f. 62	f. 67v.	f. 72	15
684				16
690	f. 62v.			17
692	f. 62v. (see f. 57v.)	f. 67v.	f. 72v.	18
705	f. 63	f. 67v.		19
710	f. 63v.			20
714	f. 63v.	f. 67v.		21
717	f. 64 (see f. 58)	f. 67v.		22
719	f. 64 (see f. 58)	f. 67v.	f. 73	23
723	f. 64v. (see f. 58)		f. 73	24
729	f. 65			25
742	f. 65v.	f. 68	f. 73v.	26
744	f. 65v.	f. 68	f. 73v.	27
747	f. 66v.			28
749	f. 66	f. 68v. (see f. 70v.)	29	
750	f. 66		f. 74	30
754	f. 69 (see f. 58v.)	f. 69	f. 74	31
769		f. 69v.		32
775	f. 69v. (see f. 58v.)		f. 74v.	33
785	(f. 58v.)	f. 70	f. 74v.	34
786	(f. 58v.)	f. 70	f. 75	35
809		f. 70v.	f. 75	
813			f. 75	

and others do not agree in such details. Clearly al-Sijzī and Kankah drew upon the same source, which, unfortunately, we cannot identify. But again, this demonstrates that Kankah is practicing astrology entirely within the tradition familiar to the ʿAbbāsid court, with no recourse to any Indian theories or techniques that were not already commonplace in Arabic astronomy and astrology by the end of the 8th century.

We conclude, then, that, while Kanaka may well have come to Baghdād from Sind, there is nothing to connect him with the embassy of 773 that brought *al-Zīj al-Sindhind* to al-Manṣūr's court; in fact, we know that the horoscopes he discussed were not computed by that *zīj* since the longitudes of the planets given in them differ from those in Sahl ibn Bishr's *Kitāb taḥāwīl sinī al-ʿālam* computed for 656, 692, and 719 'according to the computation of the *Sindhind*'[45]. Nor was he the master of astronomy imagined by Abū Maʿshar, nor the doctor, philosopher, alchemist, magician, and King of Egypt that he was described as being as a result of being confused with the three Hermes of the *Kitāb al-ulūf*. He was a quite ordinary astrologer trying to please his Caliphal patrons. Still, I hope that you may be persuaded that the astrology of his *Great Book of Conjunctions* is not without its interesting aspects. And his presence in Baghdād with astrologers from Syria, Alexandria, Iran, Ṭabaristān, and Khurāsān, as well as Arabia, confirms the cosmopolitan character of that great city in the early decades of its existence.

[45] *Vat. arabo* 955, ff. 170, 173, and 173v.

CHAPTER 6
ARABIC ASTROLOGY IN BYZANTIUM

As has been indicated in the two preceding chapters, Arabic astrology was formed in the second half of the 8th century out of elements derived directly from Greek sources, especially through the Syrian savant Theophilus of Edessa who served the first ʿAbbāsids and died in 785 as the astrological military advisor of the Caliph al-Mahdī, and indirectly from Greek authors such as Dorotheus of Sidon and Vettius Valens of Antioch whose works had been translated into Pahlavī in the 3rd century and developed in new ways by Sasanian astrologers. The Pahlavī texts that informed most of the early ʿAbbāsid astrologers — Nawbakht al-ḥakīm from Iran, his son Khurshādhmāh known as Abū Sahl, Māshāʾallāh ibn Atharī, a Persian Jew from Baṣra, ʿUmar ibn al-Farrukhān from Ṭabaristān, and al-Faḍl ibn Sahl from Sarakhs — were rooted not only in translations from the Greek, but as well in some from Sanskrit. From the Indians the Sasanians derived the branch of astrology known as interrogations (ἐρωτήσεις) in which the astrologer answers his client's queries on the basis of the horoscope of the moment that the question was posed; this is an Indian development from the Greek catarchic astrology (καταρχαί) in which the astrologer chooses the time for his client to undertake some enterprise by finding a horoscope that will promote its success. Both interrogational and catarchic astrology were popular among Persians and Arabs, and the latter transmitted their versions of these astrological techniques to the Byzantines through a series of translations. The Sasanians also received from the Indian tradition the techniques of military astrology, and they developed from Greek methods of continuous horoscopy, especially those expounded by Dorotheus, a more elaborate system of examining the anniversary horoscopes of the natives as well as

the horoscopes of every month and day of their lives, and of computing the planetary periods into which each native's life was divided along with their sub-periods and sub-sub-periods. Finally, combining the Dorothean idea of anniversary horoscopes with the Indian theories of vast *yugas* containing integer numbers of rotations of the planets, the Sasanians invented historical astrology which foretells the fates of nations, prophets, dynasties, and individual kings from the horoscopes of the conjunctions of Saturn and Jupiter, which recur within each of the four triplicities twelve or thirteen times before their transfer to the next triplicity after 240 or 260 years, so that they return to their initial triplicity after a period of time very close to a millennium; and from the horoscopes of the revolutions of the world-years, that is, of the solar years beginning with the Sun's entry into Aries. All of these forms of astrology were assiduously practiced at the ʿAbbāsid court at al-Hāshimīyah and, after its founding in 762, at Baghdād, where Theophilus of Edessa was employed in the Caliph's service. It is the Greek works of Theophilus and of his student, Stephanus the Philosopher, perhaps originally from Alexandria like his homonymous predecessor who flourished under Heraclius, which first introduced interrogational, military, and political astrology to Byzantium in about 775 A.D. when Stephanus moved to Constantinople from Baghdād, apparently bringing with him, among other manuscripts, those of Theophilus' works[1]. In or shortly after 775 he wrote his history of the Caliphs from Muḥammad to al-Mahdī, the Ἀποτελεσματικὴ πραγματεία, which is based on an interpretation of the horoscope of 1 September 621, the beginning of the Byzantine year in which occurred the Hijra of the Prophet[2]. There also survives in a 14th century Byzantine compilation to which we will turn later a brief piece by Stephanus on the political significance of the great, middling, and minor conjunctions of Saturn and Jupiter[3]. Military astrology of the type taught by Theophilus first is recorded as having been employed in Byzantium by Pancratius, the imperial astrologer, at the Bulgar siege of Marcellae in the summer of 792[4].

Among the manuscripts brought to Byzantium by Stephanus was probably the forebear of the common ancestor of *Laurentianus* 28, 34[5], and of a substantial part (ff. 1-160) of *Vindobonensis philosophicus graecus* 115[6].

[1] D. Pingree, 'Classical and Byzantine Astrology in Sassanian Persia', *DOP*, 43, 1989, pp. 227-39, esp. pp. 236-9.

[2] H. Usener, *De Stephano Alexandrino*, Bonn 1880, pp. 17-32.

[3] D. Pingree, 'Historical Horoscopes', *JAOS*, 82, 1962, pp. 487-502, esp. pp. 501-2.

[4] *Theophanis Chronographia*, edited by C. de Boor, vol. 1, Leipzig 1883, pp. 467-68; see Pingree, 'Classical and Byzantine Astrology', *cit.*, p. 239.

[5] *CCAG*, 1, pp. 60-72.

[6] *CCAG*, 6, pp. 16-28.

The Laurentian manuscript was copied in about 1000; the latest datable item in it is a list of astrolabe stars whose coordinates are given for 908[7]. The Viennese manuscript was copied in the early 13th century, before a second scribe wrote a note in it mentioning the date 1241; the latest datable element found in the part of the Viennese manuscript that can be associated with the *Laurentianus* is a computation of the date in the Egyptian, Alexandrian, and Roman calendars of the heliacal rising of Sirius at the beginning of the reign of Romanos in 919[8]. The direct ancestor of the two surviving manuscripts, therefore, was copied towards the middle of the 10th century; its antecedent was perhaps in the hands of someone in the circle of Leo the Philosopher if not of Leo himself[9], for the Laurentian contains scholia attributed to Leo[10], and another note refers to the expulsion of Patriarch Photius (this probably refers to his final exile in 886)[11], while the Viennese manuscript contains a computation made for the beginning of the reign of the Emperor Theophilus in 829[12]. Together the two manuscripts contain most of the four works of Theophilus of Edessa, on catarchic – interrogational[13], general[14], military[15], and historical-political[16] astrology; and the short pieces on astrology by Leo include two on political astrology that seem to be inspired by Theophilus[17]. The first influx of Arabic astrology into Byzantium, then, was not due to translations, but seems to have been due to a unique event, the coming of Stephanus to Constantinople in about 775; and no further influx of Arabic astrology can be shown to have occurred during the 9th and 10th centuries. However, it is to be noted that selections from Abū Maʿshar's catarchic and interrogational astrology are already inserted into that part of the Vienna manuscript that is closely related to the *Laurentianus*[18], while the last seven *folia* of the *codex* contain a collection of excerpts from Arabic works including one from Καπίσης[19] (ʿAbd al-ʿAzīz al-Qabīṣī[20], an astrologer at the

[7] F. 143v. This seems to be identical with the star-list used by the maker of the unique Byzantine astrolabe, now at Brescia.

[8] F. 143v., edited by W. Kroll in *CCAG*, 6, pp. 79-80.

[9] D. Pingree, *DSB*, vol. 8, New York 1973, pp. 190-92.

[10] F. 83v., edited by F. Cumont in *CCAG*, 1, p. 139.

[11] F. 83v., edited by A. Olivieri in *CCAG*, 1, p. 140.

[12] See note 8.

[13] *L(aurentianus)* ff. 68-81v. and 170v.; *V(indobonensis)* ff. 83v.-107 and 109v.-117. *L* ff. 71v.-73 contain an insert purely on interrogations (from an Arabic source); this is omitted in *V*.

[14] *L* ff. 95-103 and 155-156; *V* ff. 17-24, 24v.-73, and 152-152v.

[15] *L* ff. 169v.-170v.; *V* f. 130.

[16] *L* ff. 58v.-61 (perhaps extending to f. 68).

[17] Edited by F. Cumont in *CCAG*, 4, pp. 92-93.

[18] Ff. 118-119; cf. f. 120.

[19] F. 218v.

[20] *GAS*, VII, pp. 170-71.

which itself was copied by several scribes in the 14th century. This manuscript contains a fragment of Simeon Seth[42], who wrote in the 11th century, horoscopes datable to 9 April 1106 and 1 June 1007[43], and an excerpt from the astrological poem, Εἰσαγωγὴ ἀστρονομίας, composed by John Camaterus[44] under Manuel I Comnenus, who was Emperor from 1143 till 1180. The *Vaticanus* is divided into three books: the first concerning mostly astronomy is on ff. 14-66v., the second on interrogations on ff. 67-158v., and the third about catarchic astrology on ff. 165-193v. Preceding the first book are the horoscopes of the coronations of the Comnenan Emperors Manuel I on 31 March 1143 and of his grandfather, Alexius I, on 1 April 1081[45], and the autobiographical defense of astrology as a Christian science penned by Stephanus the Philosopher shortly after his arrival in Constantinople in about 775[46].

The first book contains of normal Greek astrology only some excerpts from Hephaestio of Thebes[47], Rhetorius of Egypt[48], and Theophilus of Edessa[49], all texts probably brought to Byzantium by Stephanus. Besides these authors there are a Greek translation of an Arabic treatise on the use of the astrolabe[50]; an excerpt on interrogations translated from the Arabic version of the Pahlavī text of Vettius Valens[51]; translations from Māshā'allāh's treatise on interrogations in the recension of Rashīq[52]; a chapter from the Greek translation of Aḥmad ibn Yūsuf's *Kitāb al-thamara*[53] or Καρπός[54], known in its Latin version as the *Centiloquium*, and attributed falsely, already by Aḥmad, to Ptolemy (the Byzantines had a complete text of the

[42] F. 32, edited by D. Pingree, 'The Indian and Pseudo-Indian Passages in Greek and Latin Astronomical and Astrological Texts', *Viator*, 7, 1976, pp. 141-95, esp. pp. 177 and 192.

[43] Ff. 115-115v.; see Pingree, *Haephestionis*, *cit.*, vol. 2, pp. XXI-XXII.

[44] Ff. 23-24.

[45] Ff. 6v.-7; see D. Pingree, 'Gregory Chioniades and Palaeologan Astronomy', *DOP*, 18, 1964, pp. 135-60, esp. pp. 138-39 note 29.

[46] Ff. 8-9v., edited by F. Cumont in *CCAG*, 2, pp. 181-86.

[47] Ff. 56-57v., edited by Pingree, *op. cit.*, vol. 2, pp. 47-52.

[48] Ff. 28-30v.; ff. 28-28v. edited by F. Boll, *Sphaera*, Leipzig 1903, pp. 41-52, 296, and 57-58, and in part by W. Hübner, *Grade und Gradbezirke der Tierkreiszeichen*, 2 vols., Stuttgart and Leipzig 1995, vol. 1, pp. 108-25.

[49] Ff. 45v., 47-8, and 50v.-51.

[50] Ff. 15v.-23.

[51] Ff. 64v. and 45.

[52] Ff. 48-50 and 51; see D. Pingree, 'Māshā'allāh: Greek, Pahlavī, Arabic and Latin Astrology', to appear. Ff. 48-48v. edited by Pingree, 'The Indian', *cit.*, pp. 151 and 181-3.

[53] *GAS*, VII, p. 157.

[54] F. 52, edited by E. Boer, *Claudii Ptolemaei Opera* III 2, Leipzig 1961, pp. 55-56 (aphorism 81).

Καρπός and about half of Aḥmad's commentary on it); and tables of coordinates of fixed stars for 1156 and 1161[55], in connection with which are named the tables of Χέκεμ (*al-Zīj al-Ḥākimī* of Ibn Yūnis), of Κουσιάρ (Kūshyār ibn Labbān), and 'one sought by us and brought by us from Egypt' where the 'us' appears to refer to Simeon Seth.

The second book, on interrogations, contains two compilations in which the questions are arranged under the twelve astrological places. The first of these[56] is based on Māshāʾallāh[57], Abū Maʿshar[58], Hephaestio[59], Rhetorius[60], and Theophilus[61]. In the margins are excerpts from these authorities and from Dorotheus of Sidon translated from Arabic[62], the Indians[63], Πορζοζόμχορ[64] the Indian (that is, Buzurjmihr[65]), Σὰχλ ὁ υἱὸς τοῦ Πέσρ[66] (Sahl ibn Bishr[67], a follower of Māshāʾallāh), Κίντης[68] (that is, al-Kindī[69]), Shādhān's *Mudhākarāt* of his teacher, Abū Maʿshar[70], and Ἠληνῶν the Jew[71] who is otherwise unknown. After the second compilation[72] come selections from the *Kitāb al-aḥkām ʿalā al-niṣbat al-falakīya* (*Book of Judgments in Accordance with the Celestial Connection*) and the *Kitāb al-masāʾil* (*Book of Interrogations*) of Sahl ibn Bishr[73]; in the margin are citations from Māshāʾallāh's student, Abū ʿAlī al-Khayyāṭ[74] (known in Greek as Ἀλεὶμ ὁ

[55] Ff. 30v.-33; see P. Kunitzsch, 'Die arabische Herkunft von zwei Sternverzeichnissen in cod. Vat. gr. 1056', *ZDMG*, 120, 1970, pp. 281-87.

[56] Ff. 67-118.

[57] E.g., ff. 68v.-70, 74-74v., 97, and 106.

[58] Ff. 67, 70v.-71, 75, 80v.-81v., 89v.-90, 95v., 106, 107-108, and 110v.-111.

[59] Ff. 75v.-80v., 81v.-85v., 112v., and 116-116v.; edited by Pingree, *Hephaestionis, cit.*, vol. 2, pp. 53-80.

[60] Ff. 71v., edited by Pingree, *Dorothei, cit.*, p. 324; and ff. 87v.-89.

[61] Ff. 90, 94, 97, 104, and 109.

[62] In the margins of ff. 73v., 74, 87, 96, and 101.

[63] In the margins of ff. 72v.; and 97v., edited by Pingree, 'The Indian', *cit.*, p. 190.

[64] In the margins of ff. 81v.-82, edited by Pingree, *ibid.*, p. 187.

[65] *GAS*, VII, p. 80.

[66] In the margin of f. 72v.

[67] *GAS*, VII, pp. 125-8.

[68] In the margins of ff. 76v. and 110v.; cf. f. 158v. On f. 111v. is a chapter from Κίντης in the main text.

[69] *GAS*, VII, pp. 130-4.

[70] In the margins of ff. 71v., 72, 75v., and 111.

[71] In the margin of f. 86.

[72] Ff. 120-136.

[73] Ff. 144-150, edited by J. Heeg in *CCAG*, 5, 3, pp. 98-110; ff. 148-150 edited together with the Arabic original and its Latin translation by V. Stegemann, *Dorotheos von Sidon und das sogenannte Introductorium des Sahl ibn Bišr*, Prag 1942, pp. 35-58. Part of this text, found on ff. 316-317 of *Marcianus graecus* 324, is edited by A. Olivieri in *CCAG*, 2, pp. 136-38.

[74] *GAS*, VII, pp. 120-21.

υἱὸς τοῦ Ῥάπτου or simply as ὁ Ῥάπτης, the weaver, a translation of *al-khayyāṭ*[75]), Ἔμβρε[76] (that is, al-ʿImrānī[77]), Abū Maʿshar[78], and an unidentified Μούγνης[79]. Finally, book two concludes with a Κρίσις[80] in which it is imagined that Valens is asked about the Prophet Muḥammad by the Sasanian king; unfortunately for the authenticity of this story, the positions assigned to the planets in Valens' judgment indicate a date of 7 November 939[81]. The text continues with quotations on interrogations alleged to come from Pythagoras, Dorotheus, Valens, the Babylonians, the Egyptians, the Greeks, the Persians, and the Indians, as well as Mugnēs and Abū Maʿshar. This whole Κρίσις seems to have been translated from an Arabic text which as yet has not been identified.

Book three is essentially book three of epitome II of Hephaestio's Ἀποτελεσματικά[82], on catarchic astrology, with excerpts from the translation of Dorotheus back into Greek from the Arabic[83], and from al-Khayyāṭ[84], Sahl ibn Bishr[85], al-Kindī[86], Abū Maʿshar[87], al-ʿImrānī[88], and the pseudo-Ptolemaic Καρπός[89] in the margins. Following book three in the *Vaticanus* are excerpts from Book I of Abū Maʿshar's Μυστήρια; all of Book II of that work (chapters 1-97 of this book are an abbreviated translation of the *Kitāb al-mudhākarāt Abī Maʿshar* (*Book of Sayings of Abū Maʿshar*) by Shādhān), and selections from Book III, which is a much shortened version of Abū Maʿshar's *Kitāb al madkhal al-kabīr* (*Great Book of Introduction*)[90]. Finally, there comes a series of excerpts taken primarily from a prose paraphrase of Dorotheus' astrological poem, and the bibliographical portion of the introduction to a book on genethlialogy by Māshāʾallāh which survives in its entirely only in a Latin translation made in about 1140 by Hugh of Sanctalla,

[75] In the margin of f. 147v., edited by J. Heeg in *CCAG*, 5, 3, p. 107.
[76] In the margin of f. 144v., edited by A. Olivieri in *CCAG*, 2, p. 136.
[77] *GAS*, VII, p. 166.
[78] In the margin of f. 144v., edited by A. Olivieri in *CCAG*, 2, p. 137.
[79] In the margin of f. 144, edited by A. Olivieri in *CCAG*, 2, p. 136.
[80] Ff. 151v.-155, edited by J. Heeg in *CCAG*, 5, 3, pp. 110-24.
[81] Pingree, 'The Horoscope', *cit.*, p. 314.
[82] Ff. 165-175v. and 177-182, edited by Pingree, *Hephaestionis*, *cit.*, vol. 2, pp. 81-125, and vol. 1, Leipzig 1973, pp. 331-33.
[83] In the margins of ff. 170v., 171, 172v., and 173.
[84] In the margin of f. 171, edited by J. Heeg in *CCAG*, 5, 3, p. 127.
[85] In the margin of f. 173.
[86] In the margin of f. 171v.
[87] In the margins of ff. 166, 166v., 170v., 171 (edited by J. Heeg in *CCAG*, 5, 3, p. 127), 171v., 172, 173, 174v., 177v., 180v., and 184v.
[88] In the margin of f. 172.
[89] In the margin of f. 175, edited by Boer, *op. cit.*, p. 41 (aphorism 21).
[90] Ff. 193-234.

and called by him the *Liber Aristotilis de ducentis quinquaginta quinque Indorum voluminibus universalium questionum tam genetialium quam circularium summam continens*[91]. Note that the presence of the same texts, often in the same recensions, link the compendium in *Parisinus graecus* 2506 with that in *Vaticanus graecus* 1056. Together, since both compendia go back to the Comnenan period, they allow us to date to the 11th century — probably around the year 1000 — extensive Greek translations of works on genethlialogical, catarchic, and interrogational astrology by Māshā'allāh, ʿUmar ibn al-Farrukhān, Abū ʿAlī al-Khayyāṭ, Sahl ibn Bishr, al-Kindī, Abū Maʿshar, Shādhān, Aḥmad ibn Yūsuf ibn al-Ḍāya, and ʿAlī ibn Aḥmad al-ʿImrānī, who is the latest author involved in this massive transmission; he died at Mawṣil in 955. We have already seen that a fragment of a Greek translation from al-ʿImrānī's younger contemporary, al-Qabīṣī, is found in the part of the early 13th century *Vindobonensis phil. gr.* 115 that is *not* parallel to *Laurentianus* 28, 34.

The translations of this first period are characterized by attempts to find Greek words corresponding to the Arabic technical terms; if possible the Greek terms are those employed in the late antique astrological treatises. As an illustration of this we can consider a list given by Sahl ibn Bishr of fourteen Arabic terms for the conditions of the planets[92], a list similar to that of Sanskrit terms found in *tājika* texts that are discussed in the next chapter.

ἐλεκπέλ transliterates *al-iqbāl*, defined as occurring when a planet is in a cardine or a succedent; the Greek states that the planet must be in a χρηματιστικὸς τόπος which Rhetorius defines as the cardines, the succedents of both the midheaven and the hypogee, and the cadent of the midheaven (thus places 1, 4, 5, 7, 9, 10, and 11 in place of 1, 2, 4, 5, 7, 8, 10, and 11). The translation is close, but not precise.

ἐλεττάρ transliterates *al-idbār*, defined as occurring when a planet is in a cadent; the Greek states that a planet must be in an ἀχρηματιστικὸς τόπος, which according to Rhetorius are the cadents of the ascendent, the hypogee, and the descendent, along with the succedents of both the ascendent and the descendent.

ἐλεττεσάλ transliterates *al-ittiṣāl*, defined as occurring when a faster planet approaches one that is slower; the Greek employs the term συναφή, while Rhetorius defines the term κόλλησις in the same way as Sahl defines *ittiṣāl*; and Rhetorius defines συναφή as a κόλλησις such that the two planets will be in conjunction within the *nychthemeron*.

[91] Ff. 239v.-242, edited by D. Pingree in the edition by C. Burnett & D. Pingree of Hugo's *Liber Aristotilis*, to appear.

[92] Edited by Stegemann, *op. cit.*, pp. 35-56.

ἐλενσερέφ transliterates *al-inṣirāf*, defined as occurring when a faster planet leaves behind one that is slower; the Greek uses the Classical ἀπόρροια.

χαλελσέηρ transliterates *khalāʾ al-sayr*, defined as occurring when the Moon is neither in conjunction nor in aspect with another planet; the Greek translates this with the Classical equivalent, κενοδρομία.

ἐλβάχση transliterates *al-waḥshī*, defined as occurring when the Moon is not only in *khalāʾ al-sayr*, but also is not in *ittiṣāl*; the Greek translates this as θηριώδης κενοδρομία, in which the word θηριώδης translates *al-waḥshī* which means 'wild'.

ἐλνάκλ transliterates *al-naql*, defined as occurring when a faster planet leaves behind one that is slower and conjoins with a third, thus 'transferring' the light. This condition is not defined in earlier Greek astrology; so the translator simply renders *al-naql* as μετακομιδή, its lexicographical equivalent.

ἐλτζέμ stands for *jamʿ al-nūr*, the gathering of light that occurs when a planet is aspected by two other planets; since this is not a condition recognized in Classical astrology, the Byzantine translator simply renders the Arabic term by the Greek συναγωγή.

ῥὰτ ἐλνούρ transliterates *radd al-nūr*, returning the light, defined as occurring when one planet applies to another which is retrograde or under the Sun's rays; again, in the lack of an older term, the Greek translates *radd* as ἀποστροφή.

ἐλμένεγ transliterates *al-manʿ*, with γ standing for *ʿayn* perhaps misread as a *ghayn*; this condition, prohibition, is defined as occurring when a third planet interferes in the conjunction of two other planets; again, the Greek translates, with the term ἐμποδισμός.

τὲφγ ἐλτεττήρ transliterates *dafʿ al-tadbīr*, 'the pushing of control'; this is defined as occurring when one planet, emerging from its own house or exaltation, conjoins with another planet and hands over its control. The Greek translates this concept as ἡ παράδοσις τῆς κυβερνήσεως.

τὲφγ ἐλκοῦβε transliterates *dafʿ al-quwwa*, 'the pushing of power', defined as occurring when one planet conjoins with another which is in its own house or exaltation and hands over its power. The Byzantine translator renders this as ἡ παράδοσις τῆς δυνάμεως.

ἐλκοῦβε transliterates *al-quwwa* 'power', of which Sahl enumerates 11 varieties; the Greek translates it as ἡ δύναμις.

ἐλδόγφ transliterates *al-ḍuʿf*, 'weakness', of which Sahl knows 10 varieties; the Greek has ἡ ἀσθένεια.

The fact that the Byzantine translator could find Classical equivalents for only five of these 14 Arabic technical terms (and two of the five are inexact) illustrates the extent to which Arabic astrology, despite its Hellenistic roots, had diverged from what was familiar to the Byzantines. But that this trans-

lator or group of translators seriously searched for the correct Classical term can be seen from his of their translation of *al-Zīj al-Sindhind* as Αἰώνια κανόνια. *Sindhind* in fact represents Sanskrit *siddhānta*, but, since the astronomical system of the *siddhāntas* was based on a *Kalpa* of 4,320,000,000 years, a popular rendition of *Sindhind* among Arab astronomers was 'eternity'[93]. Clearly this is the meaning understood by the Byzantine translator, who also recalled that in the ninth book of his *Syntaxis mathēmatikē*[94] Ptolemy speaks, disparagingly, of the similarly named Αἰώνιοι κανόνες, and/or that the Αἰώνιοι κανόνες are also mentioned by Vettius Valens in book six of his *Anthologies*[95]. This very learned translation of *al-Zīj al-Sindhind* as Αἰώνια κανόνια occurs in the Byzantine text of Abū Ma'shar's *Kitāb aḥkām taḥāwīl al-mawālīd*[96] and in that of Shādhān's *Mudhākarāt*[97], proving that these two were translated in the same school, perhaps by the same translator (just these two works were translated from Greek into Latin by Stephanus of Messina); other linguistic similarities among all these translations that I have so far mentioned show they all have the same origin.

Only with Arabic words derived from Pahlavī, which seem not to have been included in whatever lexicographical aides were available to them, did these Byzantine translators of the early 11th century have to resort to simple transliteration. Some examples are the following:

δερπεζᾶν[98] occurs once in the sense of δεκανός. The Arabic text read *darījān*, a transliteration of the hypothetical Pahlavī *darīgān*[99], which is derived from the Sanskrit version, *drekāṇa*, of δεκανός. The Byzantine translator read the two dots under *yā* as one, thereby converting it into a *bā*; so that his reading, *darbajān*, became δερπεζᾶν.

ζαμοκτάρ[100] stands for the Arabic *jārbakhtār* with the *bā* misread as a *mīm*; *jārbakhtār* is from the Pahlavī *jār-bakhtār* meaning 'the distributor of time'.

νουπάχρατ and its several variants[101] transliterate the Arabic *nawbahra*,

[93] *Al-dahr al-dāhir*; see Ibn al-Adamī quoted in F.I. Haddad, E.S. Kennedy & D. Pingree, *The Book of the Reasons behind Astronomical Tables*, Delmar 1981, p. 223.

[94] Σύνταξις μαθηματική IX 2, edited by J.L. Heiberg, 2 vols., Leipzig 1898-1903, vol. 2, p. 211.

[95] Ἀνθολογίαι VI 2, 2, edited by D. Pingree, Leipzig 1986, p. 232.

[96] Pingree, *Albumasaris*, *cit.*, p. 11.

[97] In section 10 of the Arabic original, section 8 of the Greek translation.

[98] Pingree, *op. cit.*, p. 239.

[99] Another Pahlavī equivalent is *dahīg*, directly from the Greek δεκανός; see A. Panaino, 'The Decans in Iranian Astrology', *EW*, 37, 1987, pp. 131-37.

[100] Pingree, *op. cit.*, pp. 126 and 129.

[101] *Ibid.*, pp. 170, 179, 180, and 235 (νουπάχρατες); p. 238 (νουπάχρατις); p. 239 (νουπάχρατος); and p. 2 (νουπεῦχρες); and Pingree, 'The Indian', *cit.*, p. 181 (νουπάχρατ), 182 (νουπάρχ), and 183 (νουποῦχρα).

which corresponds to Pahlavī *nō bahr*[102]; the Pahlavī is a translation of the Sanskrit *navāṃśa*, meaning a ninth part of a zodiacal sign.

σαλχοδάης (σαλχαδάης)[103] transliterates the Arabic *sālkhudāh*, which stands for the Pahlavī *sāl-xwadāy*, 'the lord of the year'. Had he known the meaning, the Byzantine translator would have used the Classical χρονοκράτωρ.

φαρτάρ[104] represents the Arabic *fardār*, a correct transliteration of the Pahlavī term that is, apparently, derived from the synonymous Greek περίοδος.

Another translator or group of translators was active in the 13th century; the translations produced at this time are less grammatically and technically correct than the earlier translations, and in particular are characterized by the use of ταλήλ, a simple transliteration of the Arabic *dalīl*, meaning 'indicator', whereas this word was represented by σημειωτικός in the earlier group. These new translations first appear in the manuscripts copied by John Abramius, a magician and astrologer active in the 1360's and 1370's[105] to whose school were due revisions of many of Ptolemy's works, including the pseudonymous Καρπός[106], as well as Epitome IV of Hephaestio[107], Epitome IIa of Rhetorius[108], and an Epitome of Theophilus; these are preserved in *Laurentiani graeci* 28, 13[109]; 28, 14[110]; and 28, 16[111], while 28, 14 also has chapters from the older translations of Sahl ibn Bishr[112], al-Kindī[113], Abū Maʿshar[114], and al-ʿImrānī[115].

In about 1380 another important manuscript, *Marcianus graecus* 324[116], was copied, in part from *Vaticanus graecus* 1056, within the School of John Abramius. This *codex* contains many of the epitomes found in the three *Laurentiani*, but they are followed by a vast Byzantine compilation of Greek and originally Arabic material falsely ascribed to an imaginary Ἀχμάτης ὁ

[102] A. Panaino, 'Considerazioni sul lessico astronomico-astrologico medio-persiano', *Lingue e culture in contatto nel mondo antico e alto-medievale*, Brescia 1993, pp. 417-33, esp. p. 427.

[103] Pingree, *Albumasaris*, *cit.*, pp. 1 and 35.

[104] *Ibid.*, pp. 15, 30, and 34. This text also preserves the related words φαρταρή, φαρταρία, φαρταρικῶς, φαρταρίτης, and φαρταρός.

[105] D. Pingree, 'The Astrological School of John Abramius', *DOP*, 25, 1971, pp. 191-215.

[106] Class γ in Boer's edition; see Boer, *op. cit.*, pp. XXXI-XXXII.

[107] Edited by Pingree, *Hephaestionis*, *cit.* , vol. 2, pp. 135-350.

[108] D. Pingree, 'Antiochus and Rhetorius', *CP*, 72, 1977, pp. 203-23, esp. 208-9.

[109] *CCAG*, 1, pp. 6-20.

[110] *CCAG*, 1, pp. 20-37.

[111] *CCAG*, 1, pp. 38-60.

[112] Ff. 303-303v.

[113] F. 303.

[114] Ff. 233-233v.

[115] F. 303.

Πέρσης and divided into four books — the first[117] on fundamentals and on historical astrology, which draws upon new translations from Yaḥyā ibn Abī Manṣūr[118] and Abū Maʿshar[119] as well as previously unrecorded material from Stephanus the Philosopher[120]; the second[121] on interrogations, largely borrowed from a second translation of Māshāʾallāh's book on that subject[122] and arranged in accordance with the twelve astrological places, supplemented by, among many other nameless authorities, the still unidentified Alī ibn Isḥāq[123]; the third[124] on genethlialogy; and the fourth[125] on catarchic astrology. The occurrence of transliterations of the Persian names of the planets[126] may indicate that at least one text in that language had been turned into Greek. The fact that both book 2[127] and book 4[128] contain the elaborate horoscope of Eleutherius Zebelenus, who was born on 10 November 1343[129], suggests that he was the compiler of pseudo-Aḥmād.

He also seems to be identical with the Eleutherius of Elis[130], a student of John Abramius, who copied *Angelicus graecus* 29[131] at Mitylene (his copying of the first 152 *folios* was completed on 24 July 1388) and *Taurinensis C. VII 10*[132], also at Mitylene, in 1389. The *Angelicus* contains a revision of the three books of Abū Maʿshar's Μυστήρια[133], much of which we saw also to be found in *Vaticanus graecus* 1056; a lengthy compendium of Classical Greek and translated Arabic material mixed together and attributed to Palchus[134], whom we shall discuss more fully in a moment; a disorderly

[116] *CCAG*, 2, pp. 4-16.

[117] Ff. 202-257v.

[118] F. 212v.

[119] Ff. 226-228, edited by A. Olivieri in *CCAG*, 2, pp. 123-30; and ff. 231v.-232.

[120] Ff. 231-231v., edited by Pingree, 'Historical Horoscopes', *cit.*, pp. 501-2.

[121] Ff. 258-272; much of this book is now lost in the Marcianus, but can be recovered from later copies, i.e., *Vindobonensis philosophicus graecus* 262, ff. 1-46, and *Ambrosianus graecus C. 37. sup.*, ff. 53-128; some chapters are also preserved in *Angelicus graecus* 29.

[122] Pingree, 'Māshāʾallāh', *cit.*, to appear.

[123] Ff. 266v.-267, edited by A. Olivieri in *CCAG*, 2, pp. 131-32. ʿAlī tells a story about the three astrologers Abū Maʿshar, Muḥammad ibn Mūsā, and ʿAlī ibn Yaḥyā.

[124] Ff. 272v.-277.

[125] Ff. 277-293v.

[126] This is from chapter 46 of book 2 as found on f. 213v. of *Angelicus graecus* 29; Καλιβᾶν (Kaywān), Οὐρμούρτως (Hurmuzd), Παχράμ (Bahram), Μέχρι (Mihr), Ναχείμ (Nāhida), Τίρι (Tīr), and Μάψ (Māh).

[127] Ff. 267-269, edited by A. Olivieri in *CCAG*, 2, pp. 132-36.

[128] F. 281v.

[129] Pingree, 'The Horoscope', *cit.*, p. 314.

[130] Pingree, 'The Astrological School', *cit.*, pp. 202-4.

[131] *CCAG*, 5, 1, pp. 4-57.

[132] *CCAG*, 4, pp. 5-15.

[133] Ff. 10-91.

[134] Ff. 91-152.

collection of excerpts from the four books of pseudo-Aḥmad the Persian[135], and another disorderly selection of chapters from Theophilus[136]. The alleged author of the second of these collections, Palchus, has been erroneously dated to the 5th century, and his attributions of material to such tantalizing ancient authorities as Antiochus, Demetrius, Dorotheus, Heliodorus, Hermes, Iulianus, Serapio, and Timaeus Praxidicus have been taken at face value. However, Palchus is not a Greek name, but a simple transliteration of the Arabic al-Balkhī said of a man from Balkh; and the 148 chapters in the collection of pseudo-Palchus include fifteen chapters copied from Rhetorius[137], who wrote in the 7th century; thirteen from Theophilus[138], who wrote in the 8th; and thirty-four from the collection found in *Parisinus graecus* 2506[139], including some apparently related to the 11th century translation of Māshā'allāh. Other material from the Byzantine versions of Arabic astrological treatises are interpolated into many chapters of this strange collection, whose author seems to be identical with the forger of the Θεμέλιον of Aḥmad the Persian, that is, Eleutherius Zebelenus of Elis. Much remains to be done in sorting out the Greek and Arabic components of this still mostly unpublished compilation.

So far we have met with only a relatively small number of Greek translations that survive in their entirety; the majority are known only in fragments. And, while some of the users of these translations can be identified, the translators themselves remain completely anonymous. Therefore, I close this survey with two translators who can be both named and dated; curiously, they both worked during the Frankish occupation of Constantinople in the 13th century. The first of these translators is Alexius of Byzantium, who turned an Arabic book on celestial omens, presumably one of the *Kutub al-mulḥama* of Daniel[140], into the Greek Ἀποκάλυψις Δανιὴλ τοῦ προφήτου[141]. In the προοίμιον Alexius tells us that, when Muʿāwiya I, Caliph from 661 till 680, invaded Anatolia during the reign of Constans II, who was Emperor from 641 till 668, he chanced upon the original Greek book of Daniel in the environs of Constantinople and had it translated into Arabic; if this story were true, this would be the earliest Arabic treatise on celestial omens known. Alexius continues that he, a δοῦλος αἰχμάλωτος or prisoner of war with the

[135] Ff. 152v.-208 and 213-66.

[136] Ff. 314v.-346v.

[137] Chapters 6, 61-63, 75-79, and 81-86.

[138] Chapters 3, 43-6, 72, 89, 140, and 142-46.

[139] Chapters 2, 8, 9, 11, 12, 14, 15, 25, 40, 41, 47, 48, 50, 60, 67, 90, 92, 93, 95, 96, 102-10, 120, 126-28, and 130.

[140] *GAS*, VII, pp. 312-17.

[141] Edited by P. Boudreaux in *CCAG*, 8, 3, pp. 171-79.

kings of the Arabs in 1245, learned Arabic and translated the *Apocalypse* back into Greek. The second translator of this period whom we know of was Arsenius the Monk, who translated the ποίημα Πέρσου φιλοσόφου τοῦ Μαζουνατῆ[142] from, he claims, the Persian language into Greek in 1266 for κυρία Θεωδῶρα. The book that was translated was the *Kitāb ʿilm al-raml*, composed in Arabic by a North African named Abū ʿAbdallāh al-Zanātī. *ʿIlm al-raml* is the science of geomancy; Arsenius represents *raml*, 'sand', with the transliterations ῥαζόλιον and ῥάμπλιον. The Lady Theodora is presumably Theodora Dukaina, the wife of the future Emperor, Michael VIII Palaeologus.

[142] A full bibliography is included in P. Kunitzsch, 'Die "Unwettersterne" und die "Geomantie" des Zanātī', *BZ*, 60, 1967, pp. 309-17.

CHAPTER 7
TĀJIKA: PERSIAN ASTROLOGY IN SANSKRIT

The direct sources of that branch of Indian astrology which is called in Sanskrit *jātaka*, that is, genethlialogy, the science of predicting the course of a native's life from the horoscope cast for the moment of his birth, were, as was shown in Chapter 3, Greek: principally the translation by Yavaneśvara in Gujarāt in 149/150 A.D. of an early 2nd century Greek work into Sanskrit prose, that was turned by Sphujidhvaja into the versified *Yavanajātaka* in 269/270 A.D., and several contemporary translations of genethlialogical books by Manetho (Sanskrit Maṇittha), by Romaka or the Roman, and by others. But, after centuries of development in India, *jātaka* was joined a millennium after Sphujidhvaja wrote by a new form of genethlialogy entitled *tājika*[1]. It is this new form, its authors, its sources, its contents, and its spread over India that I wish to discuss in this chapter.

The word *Tājika*[2] itself is one name by which immigrants from Iran were known in India. It is a Sanskrit transliteration of the Pahlavī *Tāzīg* (modern Persian *Tāzī*), meaning 'Arab'; for the Indians it, much as did the terms Yavana and Turuṣka, came to signify any foreigner from the West without greater specificity, so that we are uncertain as to whether the texts that were

[1] D. Pingree, *Jyotiḥśāstra*, Wiesbaden, 1981, pp. 97-100.

[2] The earliest Sanskrit reference to Tājikas in Gujarāt that I know of is in the Kavi Plate of Jayabhaṭa IV, dated A.D. 736; see V.V. Mirashi, *Inscriptions of the Kalachuri-Chedi Era*, *CII*, 4, 2 vols., Ootacamund 1955, vol. 1, pp. 96-102 (The Tājjikas are mentioned in line 6 as having been defeated by Jayabhaṭa at Valabhī).

translated into Sanskrit to be the basis of this new form of genethlialogy were originally written in Arabic or in Persian, or included texts written in both languages. The fact that the numerous technical terms are in Arabic is not decisive in this question since the Persian texts would also have used these Arabic technical terms; in a few instances the Sanskrit transliterations of these technical terms follow Persian pronounciation, but that may simply reflect the fact that the Indians learned how to read Arabic texts from speakers of Persian.

The first two verses of the oldest text on *tājika*, the *Tājikatantrasāra*, also known as the *Karmaprakāśikā*, the *Gaṇakabhūṣaṇa*, and the *Mānuṣyajātaka*, composed by one Samarasiṃha, are:

natvā giraṃ gaṇapatiṃ gṛhakarmamukhyaṃ
taṃ karmasākṣiṇam alakṣyaguṇaṃ guruṃ ca//
śrīkhindikoktagurutājikatantradīpāt
karmaprakāśam anudīpakam uddharāmi// 1 //
śrīgargādimunipraṇītam akhilaṃ satyādibhiḥ kīrtitaṃ
śāstraṃ jātakasāram ādyayavanair yad romakādyaiḥ kṛtam//
tad dhorājaladher udasya paramaṃ natvā padābjaṃ guror
vakṣye bhogarasāditas tanubhṛtāṃ nityaṃ camatkārikam// 2 //

'1. Bowing down to Vāc and to Gaṇapati, to the foremost householder (Agni), to that witness of acts (Sūrya), and to the teacher whose qualities cannot be qualified (Bṛhaspati), I extract a little lamp throwing light on actions from the mighty *Tājikatantradīpa* enunciated by Khindika.

2. Raising from the ocean of horoscopy the whole science, the essence of genethlialogy, which had been brought forth by sages such as Garga, praised by (Brāhmaṇas) such as Satya, and composed by the ancient Greeks (Yavanas) and Romans, having bowed down to the most exalted lotus-feet of (my) teacher, I shall tell that which is ever astonishing for the enjoyment and savoring of humans'.

From these verses we learn that the *Tājikatantrasāra* had two sources: the *Tājikatantradīpa* of Khindika[4], a name which is probably derived from the Arabic or Persian word *Hindī*, meaning an Indian, and the *jātaka* tradition of India as represented by Garga[5], Satya[6], by the ancient Yavanas[7] (that is, those such as Yavaneśvara[8], long before the contemporary Yavanas, who were the Muslims), and by the Romakas[9], thereby recognizing the foreign

[3] *CESS*, A 6.
[4] *CESS*, A 2, p. 80a.
[5] *CESS*, A 2, pp. 115b-126a; A 3, pp. 29b-31a; A 4, pp. 78a-80b; and A 5, pp. 78a-86b.
[6] *CESS*, A 6.
[7] *CESS*, A 5, pp. 325b-330a.
[8] *CESS*, A 5, p. 330b.
[9] *CESS*, A 5, pp. 517a-518a.

origin of *jātaka* and justifying by mentioning the precedent his own use of works by Mlecchas. Unfortunately, the *Tājikatantradīpa* has not been as yet discovered among the tens of thousands of Sanskrit manuscripts on *jyotiḥśāstra* that have been examined up to now, so we know the very earliest work on *tājika* only from some quotations by later *nibandhakāras* (composers of anthologies). But Samarasiṃha is correct in stressing that this new *śāstra* is a conflation of Islamic and Indian traditions; for *tājika*, as we shall see, has a basic Indian core to which are added elements derived from the Arab/Persian texts on which it drew.

Samarasiṃha, at the end of the *Tājikatantrasāra*, presents us with some information concerning himself and his family. He was the son of Kumārasiṃha, the son of Sāmanta, the son of Śobhanadeva, the son of Caṇḍasiṃha of the Prāgvaṭa lineage, one of the major kinship groups or *jñātis* in Saurāṣṭra, the peninsular part of Gujarāt. Caṇḍasiṃha had been a *saciva* or minister of a Caulukya king; the Caulukyas ruled Saurāṣṭra from A.D. 940 till 1245, when they were succeeded by the Vāghelas[10]. Since Samarasiṃha's great-great-grandfather served a Caulukya, perhaps about 120 years before Samarasiṃha composed the *Tājikatantrasāra*, that text can be dated between about 1060 and 1365. If Caṇḍasiṃha were identical with another member of the Prāgvaṭajñāti, Caṇḍapa, also a minister of a Caulukya monarch[11], probably Bhīma I who reigned from about 1094 till 1143, and the great-great-grandfather of Vastupāla and Tejaḥpāla, who were ministers to Lavaṇaprasāda and his son, Vīradhavala, in the first half of the 13th century, we could place Samarasiṃha's *floruit* in that half-century. But a single manuscript, apparently the oldest of the *Tājikatantrasāra* yet identified (it was copied in 1293 and is now in Jāmnagar[12]), is said to provide evidence that Samarasiṃha wrote this work in 1274. This date remains to be checked; but, accepting it provisionally, we can affirm that the translation from the Arabic or Persian work associated with the name Khindika into Sanskrit occurred in Saurāṣṭra in the early 13th century while the peninsula was still free of Muslim rule, though, of course, had already a large population of Muslim merchants, for whom mosques had been built, partly financed by Caulukyan authorities, at Stambhatīrtha (Cambay), Somanāthapaṭṭana, and

[10] The history of both dynasties is dealt with in A.K. Majumdar, *Chaulukyas of Gujarat*, Bombay 1956.

[11] In the genealogy given by Someśvara in *Kīrtikaumudī* 3, 4, for instance, Caṇḍapa is called *mantrimaṇḍalamārtaṇḍa*. Someśvara authored inscriptions for Vastupāla and Tejaḥpāla between 1232 and 1255; his *Kīrtikaumudī* was edited by Puṇyavijaya Sūri in *SJS*, 32, Bombay 1961, pp. 3-42.

[12] Goṇḍal (*jyotiṣa*) 36 in *Śrī Bhuvaneśvarī Pīṭha, Goṃḍala-Saurāṣṭra. Catalogue & Index of Manuscripts*, [Goṇḍala] 1960, p. 43. This collection is now in the Medical College at Jāmnagar.

elsewhere. Thus, this intellectual transmission occurred in much the same way and place as had that of Greek astrology and astronomy a thousand years earlier.

The next extant Sanskrit text on *tājika* is the *Daivajñālaṅkṛti* composed by another member of the Prāgvaṭajñāti, Tejaḥsiṃha, in 1336[13]. Tejaḥsiṃha's father, Vikrama, had been a minister under the last reasonably successful Vāghela king of Saurāṣṭra, Sāraṅgadeva, who reigned from about 1276 till 1296, so that he, like Samarasiṃha, belonged to a politically prominent family, though long before Tejaḥsiṃha wrote, in 1304, a Muslim army under Ulugh Khān, the general of ʿAlā al-Dīn Khaljī, overthrew the last of the Vāghelas, Karṇa, and converted Gujarāt into a province of the Delhi Sulṭān.

One of the most popular works on *tājika* in Gujarāt, Rājasthān, and Madhyapradeśa was the *Tājikasāra* of Haribhaṭṭa[14], who unfortunately gives no information at all about himself. He does, however, mention, twice within the text, the year Śaka 1444, which if taken, as normally, to refer to the Śaka era, would correspond to A.D. 1523. However, there exist two manuscripts of the *Tājikasāra* that were copied long before this date, one in 1404[15] and the second in 1425[16]; therefore, one is forced to understand *śaka* in the verse in which this date is given to refer, as sometimes it does, to the Vikrama era, so that the *Tājikasāra* was written in about 1388 A.D. The place at which Haribhaṭṭa composed it can only be guessed at from the facts that the manuscript dated 1404, just 16 years after the putative date of composition, was copied in Nāvnapura, which is probably Navānagara the present Jāmnagar in northwestern Saurāṣṭra on the Gulf of Kaccha, and that almost all of the two hundred or so extant manuscripts can be shown to have been copied or now are kept in libraries located in the three provinces in which it was popular. If Haribhaṭṭa was indeed a resident of Saurāṣṭra, this new science of *tājika* was confined for its first century and a half to that peninsula where Muslims, Hindus, and Jainas shared common interests, both commercial and, it now appears, intellectual.

Of a somewhat later date probably — the earliest manuscript was copied in 1475 — is the *Varṣaphala* ascribed to Maṇittha[17]. In the earlier astrological literature in Sanskrit Maṇittha refers to a Yavana, and the name corresponds clearly to the Greek Μανέθων under which name there still exists a

[13] *CESS*, A 3, pp. 89a-89b and A 4, p. 104a.

[14] *CESS*, A 6.

[15] British Library 503 (or 3354c) was copied by Sumatihema Muni, the pupil of Paṇḍita Sumatisundara Muni, at Nāvnapura on Tuesday 28 October 1404. C. Bendall, *Catalogue of the Sanskrit Manuscripts in the British Museum*, London 1902, p. 209 (the attempt there to read *saṃ.* 1461 as referring to *śaka* 1461 is not persuasive as the weekday will not fit).

[16] LDI (LDC) 5638 was copied in *Saṃ.* 1482 = A.D. 1425.

[17] *CESS*, A 4, pp. 343b-344a; and A 5, p. 269b.

Greek astrological poem, the Ἀποτελεσματικά in six books. This name was chosen as his pen-name by the unknown author of the *Varṣaphala* both because the contents of that work were of foreign origin as were those of the lost treatise by the earlier Maṇittha, and because the name Maṇittha sounds very much like one of the Arabic technical terms common in *tājika* texts, *munthahā* (in Arabic usually called *intihā'*), which may be defined as a point that moves at the rate of one zodiacal sign a year, beginning from the ascendent at the native's birth — one of those components of continuous horoscopy that appear to have been invented in Sasanian Iran and adopted in Arabic astrology in the early ʿAbbāsid period. The *Varṣaphala* was far less popular than the *Tājikasāra*; in fact, I know of only twenty manuscripts. All of these came from, and many are still preserved in, Gujarāt and Rājasthān, which is almost certainly, then, the area in which pseudo-Maṇittha composed it.

Towards the end of the 15th century Keśava, an extremely influential astronomer and astrologer from Nandigrāma (modern Nandod) in Gujarāt near the mouth of the Narmadā River, composed an extremely concise (there are just 27 verses) summary of *tājika* entitled *Varṣaphalapaddhati*[18]. This proved, like most of his many works, to be rather popular; some eighty-five manuscripts have been identified, and they are found all over Gujarāt, Rājasthān, Uttarapradeśa, Madhyapradeśa, and Mahārāṣṭra.

In about 1575 Keśava's grandson, Nṛsiṃha, wrote at Nandigrāma a treatise on prorogation, the *Hillājadīpikā*[19]. The *hillāja* of the title is the Arabic *haylāj*, derived from the Pahlavī *hilāg*, referring to the Greek ἀφέτης; the word *hilāg* was invented when the astrological poem of Dorotheus of Sidon was translated into Pahlavī in the middle of the 3rd century A.D. This is not the first occurrence of this word and the theory of the prorogator that appears in Sanskrit; the theory appears, in a fragmentary form, in the *Yavanajātaka*[20] composed by Sphujidhvaja in 269/270 to which we have referred in chapter 3 as one of the primary sources of *jātaka*, but was thereafter ignored in India. The prorogator, under its Arabic name, found its way to India again in the sources of Samarasiṃha, who uses it properly to help determine the date of the native's death.

Meanwhile, *tājika* had spread south from Nandigrāma to Pārthapura, a town on the Godāvarī southwest of Devagiri; in Pārthapura there lived, as a member of a notable and extremely productive family of *jyotiṣīs*, Sūrya[21].

[18] *CESS*, A 2, pp. 71a-72a; A 4, pp. 65a-65b; and A 5, pp. 58b-59a.

[19] *CESS*, A 3, pp. 203b-204a; A 4, p. 162b; and A 5, p. 202b.

[20] *Yavanajātaka* XXXV; see D. Pingree, *The Yavanajātaka of Sphudjidhvaja*, *HOS*, 48, 2 vols., Cambridge, Mass. 1978, vol. 2, pp. 329-30.

[21] *CESS*, A 6.

He, in about 1550, wrote a *Tājikālaṅkāra*; and about fifty years later his cousin, Gaṇeśa, published a widely read *Tājikabhūṣaṇa*[22]. This southward spread of *tājika* was continued by Yādava Sūri, who wrote his *Tājikayoga-sudhānidhi* at Vāī on the Kṛṣṇā River in 1616[23].

But by this time the Mughals had established their authority in North India, and, under Akbar, extended their dominion to the West and the South. Gujarāt had been overwhelmed by Akbar himself in 1572-1573; a revolt in that province was put down between 1583 and 1592 by ʿAbd al-Raḥīm, who received as a reward during the course of the campaign the exalted title and position of *Khān-i Khānān*. In 1591 the Mughal armies moved against the Kingdom of Ahmadnagar; this long campaign was led in many of its phases by the *Khān-i Khānān*, who, in fact, won a decisive battle against the army of Ahmadnagar and its allies at Pārthapura itself in 1596, and finally took Ahmadnagar in 1600. The *Khān-i Khānān* was at this time 44 years old; and, in addition to his exercise of onerous military and administrative offices, had become an accomplished poet in Turkī, Persian, Arabic, Sanskrit, and several dialects of Hindī, and the patron of numerous literati in all of these tongues[24]; unfortunately, we do not know when he became acquainted with *tājika*, or when he wrote his celebrated poem on it, the *Kheṭakautuka*, in 124 verses of mixed Sanskrit and Persian[25]. This undoubtedly appealed to him because, though he was a devout Muslim, he clearly strove for harmony between Muslims and Hindus and had great respect for Sanskrit learning. The *Kheṭakautuka* was not the only poem he wrote in a mixture of Sanskrit and Persian; the meter always seems to have been Indian.

Another possible bit of evidence for an interest at the Mughal court in *tājika* as a link between Muslims and Hindus is in the work of Nīlakaṇṭha, whose family came from Dharmapura on the Godāvarī in Vidarbha. This astrologer, who apparently served as Akbar's Hindu Jyotiṣarāja or Royal Astrologer, was commissioned by another of Akbar's Hindu officials, Ṭoḍaramalla[26], who eventually became *vazīr* (in 1577/78) and *dīwān* (in 1582/83), to write some sections of the vast Sanskrit encyclopedia that he patronized and called after himself the *Ṭoḍarānanda*, on *jyotiṣa*, *dharma*, *āyurveda*, and other topics; this task Nīlakaṇṭha performed between 1572 and 1582[27]. In 1587 he completed the second of the two *tantras* of his wildly popular *Tājikanīlakaṇṭhī*[28]; of this work I know of nearly 800 manuscripts

[22] *CESS*, A 2, pp. 107a-109a; A 3, p. 28b; A 4, pp. 75b-76a; and A 5, pp. 74b-75a.
[23] *CESS*, A 5, pp. 335a-335b.
[24] C.R. Naik, *ʿAbdu'r-Raḥīm Khān-i-Khānān and his Literary Circle*, Ahmedabad 1966.
[25] *CESS*, A 2, pp. 79b-80a; A 3, p. 26a; A 4, pp. 69a-69b; and A 5, p. 63a.
[26] *CESS*, A 3, pp. 77b-78a; A 4, pp. 100b-102a; and A 5, pp. 123b-124a.
[27] *CESS*, A 3, pp. 177b-180a; A 4, pp. 142b-143a; and A 5, pp. 186a-186b.
[28] *CESS*, A 3, pp. 180a-189a; A 4, pp. 143a-144b; and A 5, pp. 186b-189b.

and dozens of printed editions. The *Tājikanīlakaṇṭhī* has spread a knowledge of *tājika* throughout all of Bhāratavarṣa, and made it one of the most common systems of genethlialogy in use in the sub-continent. Nīlakaṇṭha states that he wrote the *Tājikanīlakaṇṭhī* for a *paṇḍita* named Śiva[29], who was perhaps that Śiva[30], the son of Rāma, who wrote a *Jātakapaddhaticintāmaṇi* in 1593, apparently at Kāśī. But Nīlakaṇṭha's initial interest in *tājika* may have been kindled by the fact that in the Mughal court two horoscopes were cast for every royal nativity, one by the Indian method, *jātaka*, prepared presumably by Nīlakaṇṭha himself, the other by the Persian method; the mingling of the two would be facilitated by the study of the previous mingling of the two astrologies in *tājika*.

Nīlakaṇṭha's brother, Rāma, had written in 1590 for an official at the Mughal court named Rāmadāsa a *karaṇa* or astronomical handbook, the *Rāmavinoda*[31], whose epoch was the beginning of the first year of Akbar's reign, 1556, thereby reviving the Sasanian tradition of each Shāh's *Zīk-i Shāhriyārān*, and had in 1600 completed the extraordinarily widely circulated *Muhūrtacintāmaṇi*[32]; Rāma was also the *guru* of a Kānyakubja Brāhmaṇa named Balabhadra. This *jyotiṣī*, at the request of Shāh Shujāʿ, the second son of the Emperor Shāh Jahān and Mumtāz Mahāl, the daughter of Āsaf Khān, compiled an immense and immensely popular *nibandha* on *tājika*, the *Hāyanaratna*[33], in 1629 at the royal palace, presumably in Agra, and another on *jātaka*, the *Horāratna*[34], in 1654 when Shāh Shujāʿ was serving as governor of Bengal. Since Shāh Shujāʿ was born in 1616, he was only 13 years old when Balabhadra completed his commission of compiling the *nibandha* on *tājika*. One wonders what or who induced the young prince to undertake this activity; perhaps it was his grandfather, the *vakīl*, Āsaf Khān, who commissioned Nityānanda of Dehli to translate Farīd al-Dīn Ibrāhīm Dihlawī's *Zīj-i Shāh Jahān* into Sanskrit as the *Siddhāntasindhu* in 1629[35] and who patronized the famous Sanskrit poet, Paṇḍitarāja Jagannātha. The *Hāyanaratna* is preserved in about 100 manuscripts, almost all of which emanate from North India, so that it did not achieve the virtually pan-Indian audience of the *Tājikanīlakaṇṭhī*. Actually, Samarasiṃha's *Tājikatantrasāra* proved to be more effective in spreading *tājika* to the south; a *Tājikasāra*

[29] *Tājikanīlakaṇṭhī*, *saṃjñātantra*, *upasaṃhāra* 3, and *varṣatantra* 9, 21, edited by Vāsudeva Gupta, Vārāṇasī 1972, pp. 160 and 249.

[30] *CESS*, A 6.

[31] *CESS*, A 5, pp. 426b-428b.

[32] *CESS*, A 5, pp. 428b-447b.

[33] *CESS*, A 4, pp. 234b-236a; and A 5, p. 230b.

[34] *CESS*, A 4, pp. 236a-237a; and A 5, pp. 230b-231a.

[35] *CESS*, A 3, p. 173b; and A 5, p. 184a.

was composed by Bhūgola Veṅkaṭeśa at Tanjore in 1624[36], and Veṅkaṭeśa's own manuscript copy of Samarasiṃha's work, copied at Mathurā, still rests on the shelves of the Sarasvatī Mahāl Library alongside four copies of his own treatise. From among the numerous other works on *tājika* I shall mention only that one which alone is known to have been composed by a Bengālī; he was Cirañjīva Bhaṭṭācārya, who was born in Navadvīpa but taught at Kāśī, where he was patronized by Yaśavanta Siṃha, a Gauḍa prince. Cirañjīva based his *Tājikaratnākara*, composed in about 1675[37], on Gaṇeśa's *Tajikabhūṣaṇa* and on Nīlakaṇṭha's *Tājikanīlakaṇṭhī*.

Now that we have seen the gradual spread of *tājika* from Saurāṣṭra over western India between the 13th and 16th centuries, and then, largely through the interest of members of the Mughal court, over the rest of the subcontinent in the 17th and 18th, we must consider what it contributed to the Indian practice of genethlialogy. The first hurdle that had to be overcome was to persuade the Indian astrologers, who were primarily Brāhmaṇas, that the use of Yavana (in this case, Arabic) words was permissible even though such a practice had been forbidden to Brāhmaṇas in the *dharmaśāstra*. In the permissive atmosphere of 13th century Saurāṣṭra, where Hindus, Muslims, and Jainas mingled fairly freely under the tolerance of the Caulukyas, Samarasiṃha was able to just hint at the solution to this problem by describing in his opening verses the traditional Indian *jātakaśāstra* as the creation of Indian *ṛṣis* and Brāhmaṇas — he names Garga and Satya as representatives of these two groups — and of the ancient Yavanas (i.e., the Greeks) and the Romans, so that, by implication, he is justified in using as one of his sources the *Tājikatantradīpa* of the later Yavana (i.e., Arab or Persian) Khindika. He strengthens this subtly stated argument by, in fact, making *tājika* an amalgam of traditional Indian and Arab/Persian ideas. Balabhadra in the 17th century felt the need to offer a far more explicit defense, clearly because some Brāhmaṇas were criticizing those who accepted Islamic science; the same opposition to foreign science during the Mughal period is evident in the Sanskrit adaptations of Muslim Ptolemaic astronomy[38]. Balabhadra[39] summarizes his opponents' argument as being that the study of *tājikaśāstra* which is characterized by Persian (*Pārasī*) words and is authored by a Yavanācārya is to be shunned by Brāhmaṇas because it is said in *smṛti*:

na vaded yāvanīm bhāṣāṃ prāṇaiḥ kaṇṭhagatair api

[36] *CESS*, A 5, p. 729a.

[37] *CESS*, A 3, p. 51b; A 4, p. 94a; and A 5, p. 111b.

[38] D. Pingree, 'Indian Reception of Muslim Versions of Ptolemaic Astronomy', in *Tradition, Transmission, Transformation*, ed. F.J. & S.P. Ragep, Leiden 1996, pp. 471-85.

[39] *Hāyanratna*, edited Mumbayī Saṃ. 1961, Śaka 1826 = A.D. 1904, ff. 1-1v.

'One should not utter a Yavana word even by breath that (accidentally) comes from one's throat'.

Even if the Persian words were replaced by Sanskrit ones, because the basic text of *tājika* is impure the whole *śāstra* is impure, and dressing it up in Sanskrit does not alter the fact that it must be avoided. Balabhadra's counter-argument is essentially the one hinted at by Samarasiṃha; the traditional list of the eighteen authors of the *saṃhitās* of *jyotiḥśāstra* given by the *ṛṣi* Kāśyapa includes Yavana, so that there is strong authority for accepting the teachings of the Yavanas. Further, he refers to a myth given in a *Romakatājika* —a myth also found in the *Jñānabhāskara*, and quoted therefrom by Balabhadra's contemporary, Nityānanda — that astronomy and astrology were taught by Brahmā to Sūrya, but then Sūrya, because of a curse, was incarnated in Romaka (that is, in Roma) and taught what he had learned from Brahmā to a Yavana. Thereby was it explained that the Yavana's *tājikaśāstra* depends, in fact, on a revelation from Brahmā. Balabhadra adds that in genethlialogy *tājika* is preferable to traditional *jātaka* because its use of continuous horoscopy makes possible more precisely dated predictions than are produced by the older methods; this also is an argument already advanced by Samarasiṃha.

As I have already mentioned, *tājika* is an amalgam of elements from Indian and Arab/Persian genethlialogy. From the former come the basic characterizations of the zodiacal signs and the planets and their respective spheres of influence, while for the necessary astronomical computations the methods of Bhāskara's *Karaṇakutūhala*[40] are employed. But both Indian and Arab/Persian planetary aspects are employed. In the Indian system sextile is to the third and tenth places rather than to the third and eleventh as in Greek astrology, trine is to the fifth and ninth in both, quartile is to the fourth and eighth rather than to the fourth and tenth as in Greek astrology, and opposition is to the seventh in both. The Arab/Persian aspects are all identical with those of the Greeks, and are named in Sanskrit *mahottamā* (a Sanskrit word clearly unrelated to the Arabic *tasdīs*), *tarabīdika* for Arabic *tarbīʿ*, *mahāśubhā* (obviously unrelated to the Arabic *tathlīth*), and *mukābilā* for Arabic *muqābila*, so that the aspects with new definitions are given Sanskrit names and those that remained the same are given Arabic names. To these is added conjunction, which is called in Sanskrit *mukāriṇā* for Arabic *muqārina*. Moreover, both the traditional Indian system of dividing the native's life into planetary periods (*daśās*) and sub-periods (*antardaśās*) and the corresponding Arab/Persian (originally Greek) methods, supplemented by the system of anniversary horoscopes and the horoscopes of the months and the days of the native's life, were incorporated into *tājika*. These last replace the Indian

[40] *CESS*, A 4, pp. 322a-326a; and A 5, pp. 261b-263a.

aṣṭakavarga system. Similarly, the traditional *jātaka ṣaḍvargas* of the planets, involving the *ucca* (exaltation), house (*gṛha*), term (*triṃśāṃśa*), ninth (*navāṃśa*), twelfth (*dvādaśāṃśa*), and decan (*dreṣkāṇa*), are replaced by the Arab/Persian *pañcavargī* — the house, the exaltation (*tājika* retains the traditional Indian longitudes of the *paramoccas* rather than adopting the slightly differing longitudes given in the Arab/Persian tradition), the terms (here, as the Arabic terms derived from Dorotheus of Sidon are used, the technical term employed is *hadda* corresponding to Arabic *ḥadd*), the decan, and the triplicity, called *muśallahā* from Arabic *muthallatha* (pronounced *musallasat* in Persian). The lords of these triplicities are those given first by Dorotheus, which then became standard in Arabic and Persian astrological texts.

The rest of *tājika* is almost entirely Arab/Persian in inspiration, though somewhat modified by the Indian astrologers. Thus, there are sixteen configurations called *yogas* (quite different from the traditional Indian *yogas*), all of which have Arabic names. In the following I give the Sanskrit transliterations of those names, the Arabic originals, the definitions of them provided by Abū Maʿshar in the 9th century[41], and, where different, those offered by Nīlakaṇṭha in the 16th[42].

ikkavāla is *iqbāl*, when the planets are in cardines and succedents.

induvāra is *idbār*, when they are in cadents.

itthaśāla is *ittiṣāl*, when a faster planet approaches one that is slower.

īśarāpha is *inṣirāf*, when a faster planet leaves behind one that is slower.

nakta is a mistake for *nakla*, which transliterates *naql*, when a faster planet leaves behind one that is slower and approaches another that is slower.

yamayā is *jāmiʿa*, when two or more planets approach another planet; Nīlakaṇṭha defines it as occurring when a slower planet is between two faster planets.

maṇaū is *manʿa*, when a slow planet or its aspect is between a faster planet and the planet that the faster planet is approaching.

kambūla is *qabūl*, when a faster planet approaches a slower planet from the slower planet's house, exaltations, term, triplicity, or decan.

gairikambūla is *ghayr qabūl*, when the *qabūl* does not occur.

khallāsara is *khalāʾ al-sayr*, when a faster planet leaves behind a slower planet and approaches no other planet either bodily or in aspect.

radda is *radd*, when a faster planet approaches one that is slower that is either combust under the rays of the Sun or retrograde. Nīlakaṇṭha says that this occurs when the planet that is being approached is in the descendent, in

[41] Abū Maʿshar, *Kitāb al-madkhal al-ṣaghīr* 3, edited by C. Burnett, K. Yamamoto, & M. Yano, Leiden 1994, pp. 40-51.

[42] *Tājikanīlakaṇṭhī*, *saṃjñātantra* 2, *cit.*, pp. 64-110.

its dejection, in an enemy's house, or deprived of its rays.

duphālikuttha is *dufā' al-quwwa*, but with *quwwa* pronounced with the *tā marbūta*, *quwwat*, which may be due to Persian influence. Abū Ma'shar defines it as occurring when a faster planet which is in its own house or exaltation approaches one that is slower.

dutthadavīra is a shortening of a transliteration of *dufā' al-tadbīr*, which occurs when the two planets involved in *ittiṣāl* are either friendly or hostile. Nīlakaṇṭha says that it occurs when the two planets involved in *dufā' al-quwwa* are both strong.

taṃvīr is *tadbīr*, which Abū Ma'shar does not define, but which in Arabic astrology refers to dominance in the nativity. Nīlakaṇṭha defines it as occurring when a strong planet at the end of a zodiacal sign aspects another planet.

kuttha, an error for *kuvva*, is *quwwa*, which term also Abū Ma'shar does not define, though it refers in Arabic astrology to the strength of a planet. Nīlakaṇṭha says that a planet is strong when it is in the ascendent, in a cardine or near to one, aspecting the ascendent, or in its own house, exaltation, decan, triplicity, or term.

And *durapha* is a pseudo-Sanskritization of the transliteration of *ḍu'f*, which again Abū Ma'shar does not define. In Arabic astrology *ḍu'f* refers to the weakness of a planet. Nīlakaṇṭha lists twenty different situations that cause a planet to be weak.

These *yogas*, though sometimes redefined by Indian astrologers, exemplify the extent to which Arabic technical terms were accepted in Sanskrit works on *tājika*.

To these *yogas* are added lots (a lot, Greek κλῆρος, was translated into Arabic as *sahm*; in Sanskrit this becomes *sahama*), which may be defined as points on the ecliptic determined by taking the longitudinal distance between two planets (for either or both of the planets the cusp of an astrological place or another lot may be used), and counting this longitudinal distance from a third planet, or a cusp, or a lot; the point or lot so found is indicative of a specified aspect of the native's life. Samarasiṃha lists 32 of these lots, Nīlakaṇṭha has 50[43], which are repeated by Balabhadra and increases by an additional 25[44]; this growth in the number of lots indicates that new Arab/Persian sources were constantly being tapped by the Indian *tājikīs*. I shall not try your patience by writing at length about the details of all these lots; I will only note that they correspond faithfully to what we are told concerning them in Persian and Arabic texts as well as, to the extent that they appear in Greek astrology, in those texts; for many lots were added to the ancient system by early authorities writing in Arabic, such as Abū Ma'shar. But the names of these lots in *tājika* are not transliterations of the Arabic

[43] *Ibid.*, *saṃjñātantra* 3, *cit.*, pp. 110–48.

[44] *Hāyanaratna* 4, *cit.*, ff. 24-31, esp. ff. 24-24v.

originals, but translations of their meanings into Sanskrit.

For the rest, *tājika* texts traditionally discuss the conception horoscope of the native, computing it not as does the older *jātaka* tradition but as do the Arabs and Persians, though both systems ultimately go back to the same Greek adaptation of a Mesopotamian method; they determine the length of life by means of the *tasīra* (Arabic *tasyīr*, prorogation) of the *hillāja*, which word we have already seen to be a transliteration of the Arabic *haylāj*; and they discuss annual events not only on the basis of the anniversary horoscope, but as well on that of the *munthahā*, also called *inthihā*, which, as we have seen, probably suggested to the author of the *Varṣaphala* the use of the ancient name Maṇittha as his pseudonym.

It has been my objective in this chapter simply to outline the history of the introduction of *tājika* into India, in Gujarāt in the 13th century, the same region of India into which Greek astrology had been introduced more than a millennium before; to trace its slow expansion over western India in the next few centuries, and its spread over almost all of India in the 17th century as a result in part at least of the interest in it shown by members of the Mughal courts at Agra and at Delhi; to discuss the arguments by which it was attempted to persuade orthodox Brāhmaṇas to regard this importation from the West as sanctioned by the *ṛṣis* as a legitimate science; and to demarkate the methods of *tājika* from those of *jātaka* though both derive from the same Hellenistic source. Much remains to be done with regard to identifying the specific sources used by the Sanskrit *tājikaśāstrakāras*, whether Persian or Arabic, and with regard to the specific details of the Indian understanding of what they received and of how it differed from their Arabic or Persian sources either because of its being viewed as simply an addition to traditional *jātaka*, or because of misunderstandings introduced by the translators or their early interpreters.

CHAPTER 8
ASTRONOMY AT THE COURT OF ANŪPASIṂHA

One of the largest Sanskrit libraries still in private hands belongs to the Mahārāja of Bīkāner. It was briefly, from the 1930's till the 1960's, known as the Anup Sanskrit Library in honor of the man who collected the vast majority of its 10,000 manuscripts, Anūpasiṃha[1], the Mahārāja from 1669 till 1698, though given the title by Aurangzīb only in 1674. Fortunately, while it was the Anup Sanskrit Library, it was for the most part catalogued by C. Kunhan Raja and K. Mādhava Kṛṣṇa Śarma[2]. As it is now an unwanted appendage to a palace hotel, it is no longer possible to consult its manuscripts. I therefore, in this chapter, make inferences based on the information presented in the published catalogue to construct a plausible story that will fit the details concerning Anūpasiṃha's career given by Ṣamṣām al-Dawla Shāh Nawāz Khān in his *Ma'āthir al-Umarā*[3]; but I believe the inferences are for the most part valid since the accumulated effect of so many similar provenances of groups of manuscripts, the names of their scribes, and the dates at which they were copied carry, for me at least, overwhelming conviction. Still what I am about to say to a large extent is conjecture and not proven fact.

[1] *CESS*, A 1, pp. 43b-44a. A monograph on Anūpasiṃha would be most useful. For a few facts and a portrait (Plate VIII) see B. Gray, *Treasures of Indian Miniatures in the Bikaner Palace Collection*, Oxford 1951.

[2] C. Kunhan Raja & K.M.K. Sarma, *Catalogue of the Anup Sanskrit Library*, 5 fascs., Bikaner 1944-1948.

[3] *The Maāthir-ul-Umarā*, translated by H. Beveridge, *BI*, 202, Calcutta 1911, reprinted in 3 vols., Patna 1979. The notice of Anūpasiṃha is in vol. 1, pp. 765-66.

I shall restrict my remarks to the efforts of Anūpasiṃha to assemble a distinguished library on *jyotiṣa* and related areas of *dharma* at Bīkāner, and his employment for its use and expansion of a professional astronomer, Vīrasiṃha[4], whom he entitled, in imitation of Mughal practice, Joṣirāya or Jyotiṣarāja, just as Savāī Jayasiṃha of Jaipur later granted Kevalarāma the same title[5]. Similarly Anūpasiṃha bestowed on his chief musician, Bhāvabhaṭṭa[6], the title Saṅgītarāya.

The office of Jyotiṣarāja, the Hindu astrologer at the Mughal Court, goes back to the time of Akbar; for an unnamed Jotik Rāy cast the horoscope of Akbar's birth (15 October 1542), during his reign, according to the Indian method[7], while Maulānā Cānd cast it for Humāyūn according to the *Zīj-i Gurgānī* of Ulugh Beg[8] and Maulānā Alyās according to the *Zīj-i Īl-Khānī* of Naṣīr al-Din al-Ṭūsī[9]. There continued to be a Jotik Rāy at the Mughal court during the reigns of Akbar[10] and Jahāngīr; during most of the time that Akbar ruled he was probably Nīlakaṇṭha[11]. In the *Muhūrtamālā* that he composed at Kāśī in 1660, Raghunātha Kavikaṇṭhīrava[12] informs us that his father, Nṛsiṃha, was awarded the title of Jyotirvitsarasa by Akbar at the capture of Āseridurga; the Fort at Āṣīr in Khāndesh was taken by the Imperial forces in August of 1600, but it is not clear whether or not Nṛsiṃha was Akbar's Jyotiṣarāja at this time (the last known date of Nīlakaṇṭha is 1587). Incidentally, Anūpasiṃha's Jyotiṣarāja owned a manuscript (Anup 4993) of the *Muhūrtamālā* that had been copied in 1662, just two years after its composition. We know, moreover, that Paramānanda[13] held the office of Imperial Jyotiṣarāja for a time under Jahāngīr, for he gives himself the title in the *Jahāṅgīravinodaratnākara*, whose epoch is 1614; its manuscript at Bīkāner (Anup 4605) was in the possession of Anūpasiṃha. A few years later Paramānanda had been succeeded by Keśavaśarman, the son of Kaṃharaśarman, a member of a family of Kānyakubja Brāhmaṇas residing in Kāliñjara; for Keśavaśarman's son, Īśvaradāsa[14], informs us that his fa-

[4] *CESS*, A 5, pp. 712b-714a.

[5] *CESS*, A 2, p. 63b; A 3, p. 23b; A 4, p. 63b; and A 5, pp. 54a-54b.

[6] His *Anūpasaṅgītaratnākara* and *Anūpasaṅgītāṅkuśa* were both edited by Bhālacandra Śarman, Poona 1919; his *Anūpasaṅgītavilāsa* was edited by the same, Poona 1921

[7] Abū al-Faḍl, *Abkar nāmā* 4, in *The Akbar Nāmā of Abu-l-Fazl*, translated by H. Beveridge, *BI*, 138, Calcutta 1897-1918, reprinted in 3 vols., Dehli 1972, vol. 1, pp. 85-95.

[8] *Ibid.*, 3, in vol. 1, pp. 69-84.

[9] *Ibid.*, 7, in vol. 1, pp. 117-8.

[10] *Ibid.*, vol. 3, pp. 42 and 54.

[11] *CESS*, A 3, pp. 177b-189a; A 4, pp. 142b-144b; and A 5, pp. 186a-189b.

[12] *CESS*, A 5, pp. 374b-376a.

[13] *CESS*, A 4, p. 186b, and A 5, pp. 211a-211b.

[14] *CESS*, A 1, pp. 55b-56a; A 3, p. 16a; and A 5, p. 18b.

ther was granted the title of Jyotiṣarāya by Jahāngīr. This information is given in the *Muhūrtaratna* that he wrote in 1663. Again, there is a manuscript of this work at Bīkāner (Anup 4998). I know of no references to a Jyotiṣarāja during the reigns of Shāh Jahān and of Aurangzīb; but, of course, this silence does not prove the disappearance of the office.

In any case, both Anūpasiṃha and, following him, Jayasiṃha had their Jyotiṣarājas, whether as revivals of the earlier Mughal tradition or as counterparts of contemporary Imperial officials. The office under Anūpasiṃha was apparently an innovation at Bīkāner. The only one of Anūpasiṃha's ancestors who is known to have taken an interest in *jyotiṣa* was Rāyasiṃha[15], who was Mahārāja of Bīkāner during the time that Akbar was Emperor; he ruled from 1573 till his death on Wednesday *amāvāsyā* of Māgha in Saṃ. 1668, which corresponds to 22 January 1612[16]. He had an astronomer named Rāmacandra Bhaṭṭa[17] at his court, who wrote a *Karaṇakalpadruma* whose epoch is 1599; the unique manuscript, still at Bīkāner (Anup 4458), contains notes written by Rāyasiṃha himself. So far as is known, Rāmacandra was not granted a title by his patron. Rāyasiṃha himself is said to have written a commentary in Rājasthānī, the *Bālabodhinī*, on Śrīpati's *Jyotiṣaratnamālā*; it is likely that the Mahārāja, then, is the author who concealed his identity under the epithet Paramakāruṇika[18]. The earliest manuscript of the *Bālabodhinī*, copied in 1636, was presented to Harvard University by Fitz Edward Hall[19], who clearly had access to some of the Bīkāner manuscripts during his stay in Rājasthān in the years immediately preceding the Indian Mutiny.

Before the death of his father, Karṇasiṃha, on Tuesday 4 *śuklapakṣa* of Āṣāḍha in Saṃ. 1726, Śaka 1591, or 22 June 1669[20], Anūpasiṃha had for several years borne the expectant title of Mahārājakumāra, but had been placed in actual charge of affairs at Bīkāner already in the ninth year of Aurangzīb (1665) because of some offence that Karṇasiṃha had given to the Emperor. While he was Mahārājakumāra, Anūpasiṃha had already begun to manifest his bibliomania by collecting manuscripts both by purchase and by the agency of a scribe, Mathena Jośī, who seems to have worked in Bīkāner and its neighborhood between 1660 and at least 1698, the year of Anūpasiṃha's death. Thus, as Kumāra, Anūpasiṃha owned manuscripts of the *Bṛhatsaṃhitā* of Varāhamihira[21] (Anup 4920), the principle Sanskrit work

[15] *CESS*, A 5, p. 503b.
[16] R.P. Vyāsa, *Bīkānera ke śilālekha*, Bīkanera 1990, p. 12.
[17] *CESS*, A 5, p. 480a.
[18] *CESS*, A 4, pp. 181b-182a; and A 5, p. 209a.
[19] Harvard 761 (no. 129 in my forthcoming catalogue of Harvard's *jyotiṣa* manuscripts).
[20] Vyāsa, *op. cit.*, pp. 31-33.
[21] *CESS*, A 5, pp. 564b-571a.

on omens, and of the *Jñānabhāskara*[22] (Anup 1645), on *karmavipāka*; both were copied by Mathena in 1660. Later, Anūpasiṃha patronized Pantoji Bhaṭṭa[23] who wrote a *ṭīkā* on the *Jñānabhāskara* that is preserved in a manuscript at Bīkāner (Anup 1649). This manuscript was copied by Mathena Sāmvala, who is presumably identical with Mathena Jośī. The Mahārājakumāra also owned a *Praśnārṇavaplava* on interrogational astrology by Nārāyaṇadāsa Siddha[24] (Anup 4889) and a *Kālamādhava* of Mādhava[25] (Anup 1664), both of which had been copied by Mathena in 1662; a *Meghamālā* (Anup 5004) on omens copied in 1663; Rāmacandra Vājapeyin's *vṛtti* on his own *Kuṇḍakṛti*[26] copied in 1666 (Anup 1743); a *Nirṇayadīpaka* of Acala[27] copied in 1667 (Anup 2441), all due to Mathena Jośī's scribal skills; and a *Madanaratnapradīpa* of Madanasiṃha[28], copied also by Mathena, here named Sāṃmidāsa, in 1668 (Anup 2542). These were all fairly standard texts on *dharmaśāstra* and *jyotiṣa*, and were clearly readily available in Bīkāner.

Anūpasiṃha also owned as Kumāra a copy of an iatromathematical text, the *Vīrasiṃhāvaloka* composed by the Ṭomara Vīrasiṃha[29] in 1382 (Anup 2615); this manuscript had been copied in 1510.

On his father's death, Anūpasiṃha inherited at least two manuscripts that Karṇasiṃha had apparently acquired in the Deccan, where he had served the Emperor Shāh Jahān at Dawlatābād and Burhānpur between 1633 and 1656. These are a copy of a very rare astronomical text, the *Nabhogasiddhi*, composed by Nārmada in about 1375[30] (Anup 4783), and one containing the most popular commentary on the *Yājñavālkyasmṛti*, the *Ṛjumitākṣarā* of Vijñāneśvara[31] (Anup 1501); the latter manuscript had been copied in 1651 while Karṇasiṃha was governor of Dawlatābād. The father, then, seems to have anticipated his son's later practice of acquiring manuscripts in the Deccan, though on a much smaller scale, so far as we can tell.

After Anūpasiṃha became Mahārāja of Bīkāner in the summer of 1669, he apparently spent a period of a few years in his capital city. During that time Mathena continued to copy manuscripts that passed into the Mahārāja's possession: a *Prayogasāra* by Viśveśara[32] (Anup 2515) on rituals and a

[22] *CESS*, A 6 sub Sūrya.
[23] *CESS*, A 4, p. 180a.
[24] *CESS*, A 3, pp. 168b-171a; A 4, pp. 140a-140b; and A 5, pp. 182a-182b.
[25] *CESS*, A 4, pp. 407a-411a; and A 5, pp. 302a-303a.
[26] *CESS*, A 5, pp. 472a-473b.
[27] *CESS*, A 4, pp. 11a-12a; and A 5, p. 3b.
[28] *CESS*, A 4, pp. 351b-353b; and A 5, pp. 275a-275b.
[29] *CESS*, A 5, pp. 711a-712b.
[30] *CESS*, A 3, p. 171b, and A 5, p. 183a.
[31] *CESS*, A 5, pp. 626a-638b.
[32] *CESS*, A 2, pp. 44b-45a.

Vasantarājasāroddhāra on omens in 1669 (Anup 5124), and a *Mahāśānti* on purification rituals according to the tradition of the *Atharvaveda* that was copied by Mathena Rāṣeca (in a later manuscript spelled Rākhecā) at Bābhaṇavāsa in 1670 (Anup 2206). It is not yet clear whether or not this Mathena was the same as Anūpasiṃha's favorite scribe.

Shortly thereafter Anūpasiṃha was summoned by Aurangzīb to serve as his father had in the Deccan. He seems to have visited, during the campaigns of the early 1670's, the town of Kheṭa (now Gangakheir) on the Godāvarī in the district of Pārthapura a region in which several important families of *jyotiṣīs* lived. One such family traced its ancestry back to Kṛṣṇadeva, who had lived in Kheṭa in the first half of the 16th century. His son, Bopadeva, was succeeded by two sons, Kāśīrāja[32] and Ballāla; and Kāśīrāja was the father of Rāmacandra and of Vīrasiṃha. It was Vīrasiṃha whom Anūpasiṃha appointed to be his Joṣirāya or Jyotiṣarāja, thereby introducing this Mughal office and Deccānī astronomy into the royal courts of Rājasthān.

Vīrasiṃha, who had been born in 1613, wrote his first astronomical treatise, the *Kheṭaplava*, when he was only twelve years old. All of the known manuscripts belong to the palace library at Bīkāner; the copy that belonged to Anūpasiṃha (Anup 4498) was copied in 1675 by Kāśīrāja, who may be identical with Vīrasiṃha's father, though he would by then have been about 85 years old. Another manuscript at Bīkāner (Anup 4822), containing a work of Vīrasiṃha, his *Pañcāṅgabhūṣaṇa*, was also transcribed by Kāśīrāja. Other manuscripts in Anūpasiṃha's library that were copied by Kāśīrāja and that, if he was Vīrasiṃha's father, were probably brought to Bīkāner by the new Jyotiṣarāja include two copies of Keśava's *Jātakapaddhati*[33] (Anup 4609 and 4610), a popular work on genethlialogy, of which the second was copied in 1644; and an unidentified set of astronomical tables copied in 1670 that had belonged to Kāśīrāja (Anup 5289).

One of the astronomical texts that Vīrasiṃha and his family were particularly interested in was the *Vārṣikatantra* composed by Viddaṇa in the Karṇāṭaka in the early 14th century[34]. Vīrasiṃha's uncle, Ballāla, had written a *ṭīkā* on it in the early 17th century[35]; there is a unique copy of this *ṭīkā* at Bīkāner (Anup 5135) as well as the unique copy of the *tīkā* by Tammaṇa, evidently also from Karṇāṭaka[36] (Anup 5134), and two unidentified commentaries (Anup 5133 and 5136). Vīrasiṃha's own revision of the *Vārṣikatantra* is contained in one of the manuscripts copied by Mathena, at a place called Chāvaṇīyeḍagāma, in 1678 (Anup 5130); I suspect this is the

[33] *CESS*, A 2, pp. 66b-70b; A 3, p. 24a; A 4, pp. 64a-65a; and A 5, pp. 56a-58b.
[34] *CESS*, A 5, pp. 646a-647a.
[35] *CESS*, A 4, p. 237a.
[36] *CESS*, A 3, p. 85a.

version found in a Harvard manuscript[37], which was acquired in Rājasthān by Fitz Edward Hall in the 1850's and differs substantially from the manuscripts that I have seen emanating from the Karṇāṭaka. Two other manuscripts of the *Vārṣikatantra* at Bīkāner (Anup 5131 and 5132) may or may not contain Vīrasiṃha's version. The library also has a unique manuscript of astronomical tables intended for use with the *Vārṣikatantra* (Anup 5137): it was copied by Madasūdana Purohita in 1647 for, I suspect, Vīrasiṃha; for Madasūdana also copied a *Bhagaṇotpatti* on the derivation of the number of rotations of the planets in a *yuga* for either Anūpasiṃha or his Jyotiṣarāja at Aurangābād in 1689 (Anup 4927).

Vīrasiṃha had written at least two other works in addition to the *Kheṭaplava* before he joined Anūpasiṃha's service; a brief *Camatkārasiddhi* has 1627 as its epoch; in it he refers to a Muslim, perhaps a patron, named Maḥmūd. This man is probably identical with the Sulṭān Maḥmūd whose *śaka* or era Vīrasiṃha mentioned in his *Saurābharaṇa*. The *Camatkārasiddhi* is the only work of Vīrasiṃha that I have been able to read, since there are two copies outside of Bīkāner; one remains in the Deccan, at the Osmania University in Hyderabad[38], while the other, now at Oxford[39], was in Benares at the beginning of this century. One of the two copies at Bīkāner was copied by a scribe named Viśvanātha in 1679 (Anup 4581). The same scribe copied in 1681 a manuscript of Vīrasiṃha's *Āryasiddhāntatulyakaraṇa* (Anup 4448), whose epoch is 1633. This manuscript belonged to the Jyotiṣarāja, for whom Viśvanātha evidently worked. Two works Vīrasiṃha certainly wrote under Anūpasiṃha's patronage; these are his *Anūpakaraṇa*, whose epoch presumably was the date of the Mahārāja's *abhiṣeka*, and the gigantic *Anūpamahodadhi*, in which he refers to an intercalary month in 1673 as in the past, one in 1681 as in the future. The *Anūpamahodadhi* deals with arithmetic, geometry, algebra, the measurement of time, the seasons, and the alleged motion of the Saptarṣis. We do not yet know the dates of Vīrasiṃha's final two works; the *Muhūrtajñasañjīvana* on catarchic astrology and the *Grahaṇasādhana* on the computation of eclipses.

I suspect that Vīrasiṃha also brought to Bīkāner many of the earlier manuscripts of *jyotiṣa* texts composed in Āndhra Pradesh, southern Mahārāstra, and the Karṇāṭaka that ended up in Anūpasiṃha's library, and played a large part in the introduction of Deccānī astronomy to Rājasthān. The most interesting of these ought to be the unique manuscript of the *Karaṇakaṇṭhīrava*

[37] Harvard 1113, ff. 1-2 and 5-10 (no 26 in my catalogue).

[38] Osmania University B. 46/4.

[39] Oxford, Chandra Shum Shere d. 791 (9), which is no. 71 in D. Pingree, *A Catalogue of the Chandra Shum Shere Collection in the Bodleian Library, part I. Jyotiḥśāstra*, Oxford 1984.

composed by Īśvara[40] at Kollamburapura under Fīrūz Shāh; the town may possibly be Kaḷambūr near Vellore in North Arcot, which briefly was ruled by a Fīruz Shāh of the Ma'bar Sulṭanate in 1341/1342. The manuscript was copied by Lakṣmīdhara in 1543 (Anup 4456). Another novelty brought to Rājasthān was a copy (Anup 4464) of the *Karaṇaprakāśa* of Brahmadeva[41], a text normally found only in the Karṇāṭaka; another incomplete copy from Rājasthān is combined with the manuscript of Viddaṇa's *Vārṣikatantra* that Fitz Edward Hall gave to Harvard[42].

Other manuscripts contain the works of members of some of the great Deccānī families of *jyotiṣīs*. I have already mentioned the *Nabhogasiddhi* of Nārmada that had belonged to Karṇasiṃha before it passed into the possession of Anūpasiṃha. Nārmada's son, Padmanābha wrote a *Dhruvabhramayantra*[43], on an astronomical instrument of that name. Two copies of it (Anup 4779 and 4780), one with the author's own *ṭīkā*, belonged to Anūpasiṃha. And there is also a manuscript of the rare *Sūryatulya* of Padmanābha's son, Dāmodara, at Bīkāner[44] (Anup 5346). These manuscripts were undoubtedly acquired in the Deccan, perhaps by Vīrasiṃha.

At Pārthapura, a few miles from Kheṭa, lived an ancient family of *jyotiṣīs* who traced their ancestry back to Rāma, who flourished in the late 14th century. The first author in this family, as far as we know, was Jñānarāja, who composed his *Siddhāntasundara* in 1503[45]; there are two copies at Bīkāner (Anup 5334 and 5335), one of which was copied in 1610. One of Jñānarāja's sons, Cintāmaṇi, wrote a commentary, the *Grahagaṇitacintāmaṇi*, on the *Siddhāntasundara*[46]; four manuscripts of this are at Bīkāner (Anup 5336, 5337, 5338, and 5339), one of which was copied in 1668 and another of which once belonged to the Jyotiṣarāja. Another of Jñānarāja's sons, Sūrya[47], is represented by three works in the Anup Sanskrit Library: his *ṭīkā*, the *Sūryaprakāśa*, on Bhāskara's treatise on algebra, the *Bījagaṇita* (Anup 4906); the *Bhāskarabhūṣaṇa* in a manuscript copied in 1572 and purchased by the Jyotiṣarāja (Anup 4930); and the *Siddhāntasaṃhitāsārasamuccaya*, in a manuscript copied in 1681 (Anup 5331). And there are six copies of the *Jātakābharaṇa* of Jñānarāja's nephew, Ḍhuṇḍhirāja[48], at Bīkāner (Anup 4530,

[40] *CESS*, A 1, p. 55b.
[41] *CESS*, A 4, pp. 257b-258b; and A 5, pp. 240a-240b.
[42] Harvard 1113, ff. 2-5 and 8-9 (no 7 in my catalogue).
[43] *CESS*, A 4, pp. 170b-172a; and A 5, p. 205b.
[44] *CESS*, A 3, p. 101a, and A 4, p. 108a.
[45] *CESS*, A 3, pp. 75a-76b; A 4, p. 100a; and A 5, pp. 122b-123a.
[46] *CESS*, A 3, p. 49b; and A 4, p. 94a.
[47] *CESS*, A 6.
[48] *CESS*, A 3, pp. 79b-84b; A 4, pp. 102a-103a; and A 5, pp. 124b-126a.

4650, 4651, 4652, 4653, and 4654). One was copied in 1663 by Gaṅgādhara at Āṃvā (modern Mominābād about 20 miles southeast of Gangakheir). The same scribe copied a *Daśāpañcakaphala*, now at Bīkāner (Anup 4757), in the same year and the same place. Finally, Ḍhuṇḍhirāja's son, Gaṇeśa, composed a widely used *Tājikabhūṣaṇa*[49] (Anup 4717) on Islamic astrology and a *Paddhatiratnāvalī*[50] (Anup 5043) on genethlialogy at Pārthapura in about 1600. There are manuscripts of both of these works at Bīkāner; that of the *Paddhatiratnāvalī* was copied by Yājñiklāl in 1648, and was once the property of one Jagatamaṇi. While we can not be certain whether or not any of these copies of the works of this productive family was brought to Anūpasiṃha's court by his new Jyotiṣarāja, that at least remains a strong possibility.

Another family of *jyotiṣīs*, one that emanated from a section of Pārthapura called Golagrāma, was founded by a different Rāma in the 15th century. His grandson, Divākara, studied under Gaṇeśa of Nandigrāma, and then apparently moved to Kāśī, where his descendents flourished till the end of the 17th century. We do not know whether members of this family from whom Vīrasiṃha may have acquired copies of their works remained in Golagrāma; but a large number of 17th century manuscripts of those works ended up in Bīkāner. Among those that belonged to Vīrasiṃha or to Anūpasiṃha (many were the property of another of Anūpasiṃha's *paṇḍitas*, Maṇirāma Dīkṣita[51],who was settled in Kāśī in the 1690's if not earlier) are the following. Surprisingly, there are no works by Divākara's famous son, Viśvanātha, at Bīkāner, though a copy of the commentary on Gaṅgādhara's rare *Candramānatantra* composed by another Viśvanātha[52], previously thought to be Divākara's son, was the property of the Jyotisarāja (Anup 4582). I note in passing that Viśvanātha's son, Tryambaka[53], wrote an astrological *Paddhatikalpavallī* for Anūpasiṃha in 1673, about the year that the Mahārāja met the Jyotiṣarāja; the unique manuscript of this work, now also at Bīkāner (Anup 4827), was copied by Tryambaka himself in 1684. Another of Divākara's grandsons, Nṛsiṃha, composed important commentaries on three astronomical treatises, the *Sūryasiddhānta*[54] (Anup 5350), Bhāskara's *Siddhāntaśiromaṇi*[55] (Anup 5325, 5326, and 5327), and Gaṇeśa's *Tithicintāmaṇi*[56] (Anup 4733); manuscripts of all three are at Bīkāner. That of the *Saurabhāṣya*, on the *Sūryasiddhānta*, was copied in 1659. Nṛsiṃha also

[49] *CESS*, A 2, pp. 107a-109a; A 3, p. 28b; A 4, pp. 75b-76a; and A 5, pp. 74b-75a.
[50] *CESS*, A 2, pp. 109a-109b; and A 5, p. 75a.
[51] *CESS*, A 4, pp. 344b-345b; and A 5, pp. 270a-270b.
[52] *CESS*, A 5, p. 674b.
[53] *CESS*, A 3, p. 94a.
[54] *CESS*, A 3, pp. 204a-205a; A 4, pp. 162b-163a; and A 5, p. 202b.
[55] *CESS*, A 3, pp. 205a-206a; A 4, p. 163a; and A 5, p. 203a.
[56] *CESS*, A 3, p. 206a.

wrote a *nibandha* on genethlialogy, the *Jātakasāradīpa*[57], of which there are seven manuscripts in the Anup Sanskrit Library (Anup 4643, 4644, 4645, 4646, 4647, 4648, and 4649); the oldest was copied in 1651. Nṛsiṃha's son, a second Divākara in this family, wrote also a genethlialogical treatise, the *Jātakamārga*[58]: the manuscript at Bīkāner was copied in 1642 by Nṛsiṃha himself (Anup 4640). All of this suggests, though it does not prove, that there was a close connection between this family, that had migrated from Golagrāma near Kheṭa to Kāśī, and Anūpasiṃha's court, and that the link was the Jyotiṣarāja, Vīrasiṃha.

Another scholar whom Anūpasiṃha apparently discovered at this time was Rāma Bhaṭṭa Hośiṅga[59], whose family also seems to have lived near the Godāvarī. He wrote a number of works for Anūpasiṃha on *dharma*, *tantra*, and *āyurveda*. Among the manuscripts that Rāma brought to Bīkāner were a copy of the *tithinirṇaya* from a *Saṅksepanirṇayasindhu* (Anup 1711) and a *Vyavahāramayūkha* of Nīlakaṇṭha[60] (Anup 2523). Some of the Deccānī *jyotiṣa* manuscripts in Anūpasiṃha's library may also have come from this source.

But the most extraordinary accession of manuscripts occurred while the Mahārāja and his Jyotiṣarāja were campaigning together in Aurangzīb's army in the Deccan: this was one of the occasions on which war facilitated the spread of scientific knowledge between regions of India that normally had little contact. In 1676 Anūpasiṃha was in command of the Imperial troops successfully defending Aurangābād against the assault of the Marāṭha leader, Śivājī. After this exploit, he apparently returned to Bīkāner, where his first scribe, Mathena Jośī, made a copy of the *Strījātaka* of Rāmacandra[61], a work on the nativities of females, in 1679 (Anup 5358). He probably used as his exemplar the manuscript of the same work that had been copied at Aurangābād in 1671, and brought back to Bīkāner (Anup 5359).

Aurangzīb and his army, evidently including the Mahārāja of Bīkāner and his Jyotiṣarāja, set off in September 1681 from Ajmīr to attack Bījāpur; the army reached Aurangābād in the Spring of 1682, and remained there till the Spring of 1685; the Mahārāja and his astrologer occupied at least part of their time acquiring manuscripts. The Anup copy of the *tithinirṇaya* from Pītāmbara Bhaṭṭa's *Dharmārṇava*[62] was copied at Karaṇapura in Aurangābād in 1681 (Anup 2435); in the same year Rāmajī Jośī copied at Aurangābād the Bīkāner manuscript of the *Smṛtikaumudī* of Viśveśvara[63] (Anup 2633).

[57] *CESS*, A 3, pp. 198a-198b; A 4, p. 158b; and A 5, p. 203a.
[58] *CESS*, A 3, pp. 106b-107b; A 4, p. 111a; and A 5, p. 141b.
[59] *CESS*, A 5, pp. 450a-451a.
[60] *CESS*, A 4, pp. 148b-150a; and A 5, p. 192a.
[61] *CESS*, A 5, pp. 462b-463a.
[62] *CESS*, A 4, p. 204a.
[63] *CESS*, A 5, pp. 698a-699a.

One of the Bīkāner manuscripts of Rāmacandra's *Kālanirṇayadīpikā*[64] was copied at Karaṇapura in 1683 (Anup 1676), while Maheśvara's work on catarchic astrology, the *Vṛttaśata*[65], was copied at Aurangābād in 1682 and acquired in that same city by the Jyotiṣarāja (Anup 5172). Another text on the same subject, the *Muhūrtacintāmaṇi* of Rāma[66], had been copied by Bauhara Gopālajī at Karaṇapura in Aurangābād in 1683, and had first belonged to one Devarāja Jaujaśa before coming into the Mahārāja's library (Anup 4970). A *Caturthīkaraṇa* had been copied by Limbā Jośī, a resident of Nirjhara, in 1685, and had first belonged to Nandalāla Miśra of Padmapura in Aurangābād before being carried off to Bīkāner (Anup 2991).

In March of 1685 Aurangzīb's army finally moved South to invest Bījāpur. The Jyotiṣarāja and his master immediately set to collecting manuscripts. Among those that they had copied at Bījāpur already in 1685 were two that deal with the application of astrology and magic to military campaigning, Narapati's *Narapatijayacaryā*[67] (Anup 4793) and Raṇahastin's *Rājavijaya*[68] (Anup 5055). Another manuscript whose contents were in part relevant to the conduct of military operations was on atmospheric and terrestrial omens, the *Śakuna* of Vasantarāja[69], also copied at Bījāpur in 1685 (Anup 5114). It was presumably at Bījāpur that they acquired a manuscript of Pṛthuyaśas' *Ṣaṭpañcāśikā* with the *ṭīkā* of Bhaṭṭotpala[70], a work on interrogational astrology, a manuscript that had been copied at Bījāpur in 1586 (Anup 5221).

The city surrendered to the Mughal forces in September 1686. Anūpasiṃha was initially rewarded for his services by the *sarkar* of Naṣratābād or Sāgara to the east of Bījāpur, near Hyderabad, and in 1689 by the diamond-producing Sabah of Ādūni, south of the Tuṅgabhadrā River. At some time during the decade and more that he spent in Mahārāṣṭra and the Karṇāṭaka he seems to have collected other manuscripts on *jyotiṣa* and *dharmaśāstra*. There is a copy of the *Kālatattvavivecana* of Raghunātha[71] that was bought for Anūpasiṃha in Mahārāṣṭra by Rāma Rāmabhaṭṭa, perhaps the same individual as Rāma Bhaṭṭa Hośiṅga (Anup 1658). A manuscript of the *Smṛtikaustubha* of Anantadeva[72] was copied in the Koṅkaṇa in 1689 (Anup 2637). The Anup Library's manuscript of Madhusūdana Dīkṣita's

[64] *CESS*, A 5, pp. 465a-467a.
[65] *CESS*, A 4, pp. 397b-398b; and A 5, p. 298a.
[66] *CESS*, A 5, pp. 428b-443b.
[67] *CESS*, A 3, pp. 137a-142a; A 4, pp. 122b-123b; and A 5, pp. 162a-164b.
[68] *CESS*, A 5, pp. 392b-393a.
[69] *CESS*, A 5, pp. 598b-602a.
[70] *CESS*, A 4, pp. 212b-221b; and A 5, pp. 219b-224a, and A 4, pp. 277b-281b; and A 5, pp. 247b-248b.
[71] *CESS*, A 5, pp. 373a-374a.
[72] *CESS*, A 1, pp. 41b-42a; A 2, pp. 11b-12b; A 3, pp. 12b-13a; A 4, pp. 15b-19b; and A 5, pp. 7a-8a.

Smṛtiratnāvalī[73] had been copied in 1415 by Svāmi Kavi, a resident of Pratiṣṭhāna, and was probably acquired in the vicinity of that town on the Godāvarī (Anup 2651). A manuscript of Rāmacandra's *Kālanirṇayadīpikā* that had been copied at Piṣādrigiri in 1617 was acquired at Nāsik (Anup 1675), as was a copy of the section on *ācāra* from the *Dinakaroddyota* of Viśveśvara Gāgābhaṭṭa, a Brāhmaṇa from Kāśī[74] (Anup 2394) who had officiated at the *abhiṣeka* of Anūpasiṃha's old adversary, Śivājī, in 1674; manuscripts of eight other parts of the *Dinakaroddyota* are found at Bīkāner. The Mahārāja's manuscript of the astrological *Jyotiṣaphalodaya* was copied at Ahmadnagar by Gopāla Jyotirvid, a resident of Pāranaragrāma (Anup 4680). One of the Anup Library's three manuscripts of an important work on catarchic astrology, the *Muhūrtadarpaṇa* composed in the Karṇāṭaka by Vidyāmādhava in about 1350[75], had been copied in 1586 by Ananta at Siṅghaṇanagara, a place named after the 13th century Yādava Mahārāja of the Sahyādris (Anup 5142). The manuscript of Śrīdhara's *Kālavidhānapaddhati*[76] copied by Nīlakaṇṭha in 1586 must also have come from the Deccan (Anup 4482): it is the only copy of this text north of the Narmadā. And the library possesses two copies (Anup 4718 and 4719), one of which belonged to Maṇirāma Dīkṣita, of the *Tājikayogasudhānidhi* composed by Yādava Sūri at Vāī in 1616[77]. From further to the east came the two manuscripts (Anup 4677 and 4678) of the *Jyotiṣadarpaṇa* and the five (Anup 4768, 4769, 4770, 4771, and 4772) of the *Daivajñavilāsa* written by Kañcam Yallaya at Koṇḍapalli in Āndhrapradeśa[78]. It may well have been in the Karṇāṭaka that the Jyotiṣarāja purchased his two manuscripts of Lalla's *Śiṣyadhīvṛddhidatantra*[79], one of the *grahagaṇita* (Anup 5198), the other of the *gola* section (Anup 4513): at least the Karṇāṭaka is the region in which this text was traditionally studied.

Anūpasiṃha is said to have been relieved of his charge as governor of Ādūni in 1691, but other accounts claim that he continued in that office till his death. However this may be, he seems to have returned at last to Bīkāner and his books. In this last phase of his life, Anūpasiṃha patronized another astronomer, Vidyānātha Sūri[80], who was the *guru* of the Ahicchatra Brāhmaṇas; it is possible that Vīrasiṃha had died by 1690, when he would have been nearly 80 years old. Vidyānātha wrote four works for the Mahārāja:

[73] *CESS*, A 4, p. 354b.
[74] *CESS*, A 5, pp. 699a-700b.
[75] *CESS*, A 5, pp. 649b-652a.
[76] *CESS*, A 6.
[77] *CESS*, A 5, pp. 335a-335b.
[78] *CESS*, A 5, pp. 323b-325a.
[79] *CESS*, A 5, pp. 545b-546b.
[80] *CESS*, A 5, pp. 648b-649a.

an enormous *Anūparatnākara* (the copy at Bīkāner, Anup 2674, has 849 *folia*); a *Jyotpattisāra* on constructing a table of Sines (the Anup Library manuscript, Anup 4697, was copied by Devadatta in 1696); a *Yantracintāmaṇi*, presumably on astronomical instruments (the unique copy, Anup 7632, is at Bīkāner); and a truly enormous *Śāntisudhākara* (the first of the two copies at Bīkāner, Anup 2230 and 2231, consists of 1096 *folia* and was copied at Ādūnigiri in 1697).

Anūpasiṃha had many other manuscripts copied for his collection at Ādūni. He usually employed a scribe named Harikṛṣna Śrīmālī or Śrīmālīkacarā (once Śrīmālavīkacarā). This man in 1691 copied the *ācāraratna* from the *Anūpavilāsa* that Anūpasiṃha's *protégé*, Maṇirāma Dīkṣita, was then busy compiling at Kāśī (Anup 2325); the Anup Library has manuscripts of the *dānaratna* (Anup 2322) and the *vatsararatna* (Anup 2321) copied in 1690, and one of the *śrāddharatna* copied in 1691 (Anup 2324). Maṇirāma Dīkṣita's work on catarchic astrology, the *Anūpavyavahārasāgara*, was copied by Kṛṣṇadatta Vyāsa at Rāicūradurga (Raichur, about fifty miles north of Ādūni) in 1689 (Anup 4426); a manuscript of Nīlakaṇṭha's *Tājikanīlakaṇṭhī*[81] had been copied for Anūpasiṃha by Mīṇṭhāka at Rāyacū in the same year (Anup 4708).

To return to Śrīmālīkacarā: he copied three manuscripts at Ādūni in 1692: an *induphala* from a *Candrārṇava* (Anup 4451), the *Praśnavidyā* of Caṇḍeśvara[82] (Anup 4555), and the *malamāsavrata* from the *Bhaviṣyottarapurāṇa* (Anup 2132). One of the two copies of Payonidhi's *Sāmudrikasāra*[83], a rare Deccānī treatise on physiognomy, was copied in 1693 (Anup 5275), but we remain ignorant of the scribe and the place of copying. At Sāgara, which Anūpasiṃha had been governor of from 1686 till 1689, Mathena Kusalīya copied a *Pañcāṅgasāraṇī* for Anūpasiṃha in 1694 (Anup 4824), and Bhūpati Vyāsa in 1695 copied the *ācāra* section of Śrīdhara's *Smṛtyarthasāra*[84], also for Anūpasiṃha (Anup 2660). In the next year, 1696, Śrīmālī copied his last manuscript, a collection of four *vedāṅgas*: the *jyotiṣa*, a *śikṣā*, the *chandas*, and the *nighaṇṭu*, at Ādūṇi in Karṇāṭakadeśa (Anup 668). Also in 1696 Someśvara Vyāsa acquired for Anūpasiṃha a manuscript (Anup 4518) of the *Grahakauśala*, composed on the basis of the *Sūryasiddhānta* in 1659 by Śambhunātha[85], a pupil of the Nityānanda[86] who had expounded Muslim astronomy in Sanskrit for Āsaf Khān in the days of Shāh Jahān; (the Anup Library has two copies (Anup 5332 and 5333] of

[81] *CESS*, A 3, pp. 180a-189a; A 4, pp. 143a-144b; and A 5, pp. 186b-189b.
[82] *CESS*, A 3, pp. 41a-41b; A 4, p. 88b; and A 5, p. 105b.
[83] *CESS*, A 4, p. 180a.
[84] *CESS*, A 6.
[85] *CESS*, A 6.
[86] *CESS*, A 3, pp. 173b-174a; A 4, pp. 141a-141b; and A 5, p. 184a.

khaṇḍa 3 of Nityānanda's *Siddhāntasindhu*, the Sanskrit translation of Farīd al-Dīn Ibrāhīm Dihlawī's *Zīj-i Shāh Jahān*, and the unique manuscript (Anup 5191) of his *Śāhajahāṃganita*). In 1697 Mānarūpa Ojhā copied a *Janmapatrīnirṇaya* (Anup 4597) and Kāśīnātha's *Jātakaratna*[87] (Anup 4641), both at Ādūni. As a result of this varied activity over a period of twenty-five years, there was a vast influx of scientific texts from the South into Rājasthān; copies of at least some of these ended up in the hands of Savāī Jayasiṃha, whose father, Rāmasiṃha, had been Anūpasiṃha's friend and fellow bibliophile; these are now in the Palace Museum at Jaipur.

On Sunday the ninth *tithi* of the *śuklapakṣa* of *adhika* Jyeṣṭha in Saṃ. 1755, Śaka 1620 — that is, on 8 May 1698 — the Mahārājādhirāja Anūpasiṃha died[88]. To paraphrase Tod's famous epitaph on Jayasiṃha, two wives, seven concubines, and nine slave girls along with an incurable case of bibliomania perished together on the funeral pyre. But ten thousand manuscripts form a fitting memorial to their passionate collector, revealing to us, in the present circumstances, not the achievements of the authors of the works they contain, but the spirit of curiosity and inquiry that inspired this warrior-scholar.

One of his courts-poets, Viṭṭhala Kṛṣṇa, wrote an *Anūpasiṃhaguṇāvatāra* in a hundred verses; I would like to conclude by quoting the ninety-first, since it combines a deserved praise of his scholarship and valor with a punning astrological identification of the Mahārāja with the effective Moon:

samyag budhena guruṇā kavinā ca dṛṣṭaḥ
spṛṣṭo na mandavadanair adhirūḍhakarkaḥ//
bhūmimṛgāṅka tanuṣe yad anūpasiṃha
bhavyaṃ bhaved iha kathaṃ mama cittacintā//

(first) Mounted on your white horse, you are seen by the wise teacher and poet, but are not touched by those whose speech is slow, oh Moon to the world! Oh Anūpasiṃha, whatever you do is proper.

(second) Oh Moon to the world, having entered your house, Cancer, you are aspected by (benefic) Mercury, Jupiter, and Venus, but are not touched in conjunction by (malefic) Saturn. Oh lion in a watery sign, whatever you effect will come to pass.

(common to both) How could there be anxiety in my mind in this matter?

[87] *CESS*, A 2, p. 35a.
[88] Vyāsa, *op. cit.*, pp. 44-45.
[89] C. Kunhan Raja, *Anūpasiṃhaguṇāvatāra by Viṭṭhala Krishna*, Bikaner 1942, p. 94.

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